

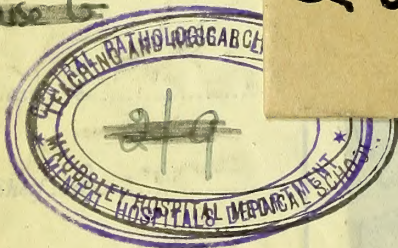
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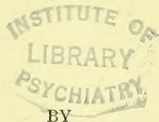
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A TEXT-BOOK OF PSYCHIATRY



A
TEXT - BOOK
OF
PSYCHIATRY

For Physicians and Students



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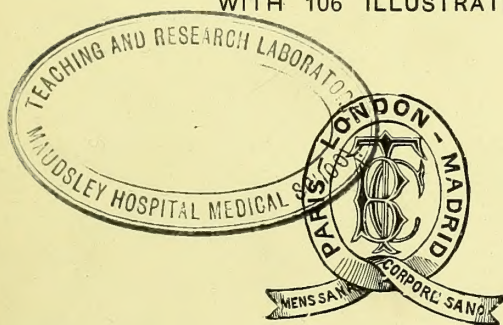
Authorized translation from the Italian

BY

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WITH 106 ILLUSTRATIONS

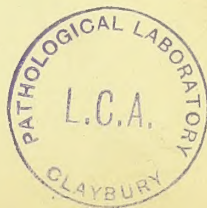


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PREFACE TO THE ENGLISH EDITION

I HAVE much pleasure in presenting to English readers this translation of Professor Bianchi's '*Trattato di Psichiatria*,' and trust that it may prove a useful addition to English psychiatric literature. Though we undoubtedly possess many excellent treatises, still it can scarcely be denied that a number of these are defective, because, dealing chiefly with the symptomatology of the mental affections and but slightly with cerebral physiology and pathology, they are by no means complete. This is not to be wondered at when we remember that the pathogenesis of insanity has all along been shrouded in mystery. No doubt pathological data have ever been accumulating both at home and abroad, but these, like stones rough-hewn from a quarry and deposited haphazard with no attempt at structural design, have, from their isolation, proved of little service, even whilst by no means wanting in intrinsic worth. Within the last decade, however, a real advance has been made. The histologist, the morbid anatomist, the pathological chemist, the bacteriologist, the biologist, the psychologist, the neurologist, and the psychiatrist, working patiently each in his own particular domain, have awakened to the fact that only by combined effort, by the co-operation of the various branches, is true progress made possible; thus, with the joining of forces, a grand architectural edifice is slowly but surely being erected on the solid foundations of physiopathology. To this end no country has contributed more largely than Italy, and no single investigator has been more fruitful than Professor Bianchi.

A treatise from the pen of so able and distinguished an observer as the author of this work must command the attention of students of psychiatry everywhere. Few men can speak with greater authority or draw from a wider experience than Professor Bianchi, who, as Minister of Public Instruction in Italy, is now entrusted with the direction of the educational affairs of his country.

In giving the treatise an English dress, it has been my aim to follow as closely as possible the original text and to act as a faithful interpreter to the author.

I acknowledge with gratitude my great indebtedness to my friend Dr. J. R. Chalmers, who revised almost the entire MS. I owe it to him that many faults have been eliminated from the translation. My thanks are also due to my colleague, Dr. Doig, and to Drs. Hunter and Tierney for much assistance in the correction and revision of proofs, and to Mr. John Mactaggart, who was a willing amanuensis.

J. H. MACDONALD.

GOVAN DISTRICT ASYLUM, HAWKHEAD,
October, 1905.

PREFACE TO THE ITALIAN EDITION

VARIOUS reasons have induced me, after hesitating long, to publish the 'Treatise on Psychiatry' which I now have the honour of presenting to students and physicians. Of these reasons, one of the most weighty was the pressing demand for a work reflecting the actual state of the science, and that, moreover, an Italian work. I cherished no illusion as to the great difficulties involved in the task. A text-book which aims at concentrating what is most important for the understanding of the phenomena of psychic life, normal and abnormal, which would include within its narrow limits what is most assured, and offer ways and means to such as desire guidance or to develop in various directions their own thoughts—such a book cannot pretend to make use of all the rich patrimony of accumulated literature having reference to psychopathology. To supply the much-felt want of a book of clinical psychiatry was my sole object in publishing this treatise. My work, however, would not be deserving of praise had I limited myself to the description of the nosographic forms and varieties of the mental affections and to the critical examination of their pathology.

To-day, in Italy, which has so largely contributed to the progress of the physiology and histology of the nerve-centres, one could not understand a book on psychiatry unless all the corollaries drawn from the various sources were utilized in the interpretation of the phenomena of psychic life. The physiology of the brain, on the solid foundations of morphology and histology, constitutes the heart and nutrient vessels of a medical work on psychiatry. For this reason I have deemed it useful to precede the description of the psychopathic forms with a first part, which summarizes the fundamental laws of the evolution of the mind in relation to the evolution of the nervous system, as well as the architectural, anatomical, and physiological plan of the human brain, particularly in relation to mental phenomena, from the most elementary to the most complex,

in which lies the synthesis of the grandest conquest in neurology in the last quarter of the past century.

Further, the consideration that—unlike the student of the present day, who is taught and gains experience in the psychiatric wards—the physician of several years' standing had no means of becoming acquainted with patients suffering from mental disorders, and is often entirely ignorant of psychiatry, has induced me to follow the first with a second part, which is, as it were, an introduction to the clinical section, being devoted to the semeiology of the mental affections—that is to say, to the examination of the elementary symptoms of the disordered mind, and to the analysis of their signification in relation to the facts of normal psychology, and to the laws which govern their manifestation.

The physiological conception of the individual psychopathies, and the description of the nosographic forms which these assume, form the subject-matter of the third part, naturally more voluminous than either of the other two.

To simplify matters for the reader, and to facilitate the understanding of the clinical forms and their groupings, was the chief end I had in view. If I have not taken the reader over the whole of the ground covered by the varieties of each morbid form, it is because I have deemed it more advantageous not to let him lose sight of their respective synthetic pictures.

The analytical method, though useful in research and in the monographic treatment of single subjects, is not equally so in the construction of a text-book, the tendency of which must be towards synthesis nourished by the bulky casuistic production, of which I have sought to give a sample wherever necessary, so as to give a better concrete form to, and a clearer impression of, the empirical and nosographic conception of the disease.

Thus it happens that where others find nosographic differences, I have been led rather to fuse and combine, and sometimes, on the other hand, to draw distinctions between clinical forms that have been confused under one name. This has not come from any desire for originality, but as the logical and inevitable consequence of the order of facts observed.

Whilst the attempts to break down the old walls that confined mental pathology have, fortunately, widened immensely the domain of the latter, they have sometimes led to the introduction of great confusion in the nosographic definition of the disease, a thorough knowledge of which is to be gained only by long observation and the prudence that comes of experience. One can well understand how, in the series of observations made in the course of years, there are some which leave a stronger impression than others, and invest the mind of the pathologist with the nosographic synthesis;

on the other hand, the individual structure stamps on the mental affection—a fact causing it to differ immensely from ordinary disease—particular characteristics, and invests it with appearances so many and varied that the observer is prone to deviate from the track of the fundamental lines that serve as guides to the nosographic diagnosis. The mental disorder issuing from the darkest depths of the mind develops in divers forms, which succeed one another and are variously commingled and complicated. It is in the midst of these, and in the historical process of their development, often covering a period of very many years, that we may retrace the conducting lines of the clinical synthesis.

As regards pathological anatomy, ætiology, and therapy, I have preferred to adhere to the method followed in general medicine, although this method involves the inconvenience of a certain amount of repetition. We must, however, recognise that it has this advantage, that we have under our eyes the pathological conception of each nosographic form, with all the differences which in some are even conspicuous. By this course we gain, I think, the unison of the parts, and the attention of the reader is not strained.

I trust that this work will meet with the approval of physicians in general and psychiatrists in particular; and I feel certain that even to lawyers and magistrates it will offer a material and means for a surer and clearer vision as regards the new horizon of the law and its altogether modern application.

PROFESSOR L. BIANCHI.



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ERRATA

Page 48, line 6, *for* 'crustaceans' *read* 'cetaceans.'

Page 139, line 26, *for* 'expressive' *read* 'impressive.'

Page 310, line 44, *for* 'erotism' *read* 'eroticism.'

Page 523, line 20, *for* 'carbonic acid' *read* 'carbamic acid.'

PSYCHIATRY

INTRODUCTION

PSYCHIATRY is the study of the deviations from the fundamental laws of the formation and manifestation of mind, and the various ways in which these deviations are displayed. Briefly, it comprises the study of mental affections in their widest sense ; but as time and environment give rise to variations in the contents and attitudes of the mind, so psychiatry must not lose sight, *inter alia*, of this double source of numerous and various factors which complete and consolidate the scientific picture of this branch of medicine.

The human mind is, in fact, among the functions of the organism, that to which is intrinsically bound the conception of progress, and which embraces all the laws of the evolution of understanding on the one hand, and of the brain on the other. We can readily imagine as rudimentary the mind of the primitive as compared with that of the modern evolved races. It is common knowledge that the mind of modern European races is greatly altered as regards the nature and number of its constituent elements, and differs from that of the Hottentots, the Kaffirs, the negroes of Loango, the Redskins, and the Malays. A rich and valuable collection of anthropological documents affords a proof of this statement. What is an anomaly or defect in individuals of a more evolved race may be a normal condition in the existence of other people who have not reached the same grade of development, or in whom the process of evolution, operated on by the most diverse circumstances, has branched off in a different direction and with a less initial velocity. For example, to the instinct of self-preservation there is added, among some people, that of a right to slay and spoil ; the chase is still a custom amongst people advancing towards civilization, but in the most advanced it has been superseded by the idea of displaying personal prowess to the advantage of the individual and the community, thus affording more or less pleasure to one's self and others.

Theft, homicide, want of chastity, are to us expressions of psychic

anomalies, and enter into the domain of psychopathy or psychoteratology, whilst they are permitted by the custom obtaining among other peoples. The gradations of civilization met with among the various races of to-day can be retraced in the history of each of the more advanced. The early Romans abandoned themselves as a matter of course to theft, slaughter, plunder, and acts of rape. Later, Rome set up codes which regulated and directed the lives of the Roman people according to the conceptions of private and public right, and these codes are still embodied in our civil legislation.

Such a marvellous development of the thought, sentiment, and attitude of the most civilized races is realized by a continuous and incessant arborization of the components of the human understanding, which year by year is further perfected by the action of all the stimuli from without which Nature is incessantly expending upon the nervous system. It is not by a process of stratification—a superimposing upon the old of the more recent products of the mind which alone seem to animate modern life—that such a high level of development has been attained.

To my mind, the idea of germination and implantation should be considered most important. On the original wild plant there is ingrafted a bud from one more cultivated. This develops, and gives off in turn branches and fruit; these are not the exclusive product of the bud grafted, but are the work of the whole plant, which furnishes the bud with nutritive material; and, according to the greater or less receptivity of the old stem, the fruit will bear some of the characters of the wild plant, or maintain entirely those of the graft. At the very least, however, the fruit embodies the essential characteristics of the latter, which has sprouted and grown, hypernourished by the old stalk, and the seeds contain germinative elements which for the most part repeat the characters of the ingrafted bud. If, however, this latter is weak, some of the characters of the old plant may be repeated. So it is with the human mind. Nature is its vast domain, and all that exists therein its rightful patrimony.

Nature is continually inserting grafts upon the old branches of the human understanding. The longer the action of its forces upon the senses, the more perfect these become, and the progressive adaptation of man is the result of the increased receptive and assimilative power exhibited by the nervous system towards the forces of Nature.

This potentiality overcomes the law of habit, which would tend to fix the mechanism in the senso-motor adaptations (*vide* L. Dumont and W. James), and enlarges the mental sphere in new directions, so that there is a continual sprouting of the new buds ingrafted upon the great intellectual stem. Thus, human thought, from the narrow circle of the individual, widens gradually over the universe,

always impressing new directions upon the conduct, along unforeseen paths of progress.*

One of the fundamental laws of psychic being, then, is that of evolution, emanating from two co-ordinating forces, one intrinsic in the primitive organism, the other extrinsic, with an incessant tendency to break through the habit of the old psychic combinations, just as occurs in organic life, only within somewhat narrower limits. The ovule is a cell which, by virtue of its inherent property and with the aid of material accumulated from without, divides and subdivides itself repeatedly into an indefinite number of other cells, which arrange themselves in various groups and dispositions, assuming different forms and functions. With the division coincide the differentiation and grouping of the cells into a progressively more complex and harmonious association.

Such a process can be followed both in the individual and throughout the entire zoological scale, from the earliest forms of life to the most complex development in man. The same law and methods are observed throughout, from the homogeneous to the hetero-

* It may happen that in the course of development an unhealthy bud becomes grafted, or that the new buds do not flourish, or, again, that agents within or without operate adversely on the whole plant or on its shoots. In each case the result is an anomalous product, always representing either a deviation from the law of development or a revival of primitive characteristics, since it is invariably the young branches that are the more markedly weak, the old stem remaining more or less unaltered.

One group of mental affections may be simply indicated thus—a revival of the primitive characteristics reminiscent of some phase through which the mind of the individual or the race has passed. In this case, owing to intrinsic conditions, the receptivity shown by the stem to the graft is defective; in other words, the aptitude to assimilate the acquisitions of the collective intellect is at fault, and so the elements of the original mental organism assume greater activity. In other cases the grafted buds do not fade away or die, but give forth offshoots, flowers, and bear fruit. The latter, however, present some characteristics of a former graft, once normal, but now no longer in harmony with the new qualities assumed by the plant. Another group of mental disorders exactly corresponds to this conception—the revival of some of the characteristics of former mental acquisitions or of aptitudes previously laid aside, forming new psychic combinations in which, naturally, there is present a certain wealth of new acquisitions.

In each case there is an anomaly of individuality. In the former it does not attain the general characteristics of the entire class, and arrest takes place (feeble receptivity for grafts).

In the second category it is different, because, at a given moment of its existence, the newly assimilated bud has not a vigorous growth, owing to defective vegetative power. In this case one of the old components of the individual or collective mind sprouts up and gives a new imprint and a new direction to all the extrinsic characteristics of the psycho-organic unit which we term personality. If the personality can undergo such a profound alteration through deviations from the law of receptivity or of development, it is not, however, the only manner in which it transforms itself, because the preservation of the personal type depends also on the intrinsic conditions governing the reciprocal position and relations of the formative elements of the mind.

geneous, the simple to the complex, the inco-ordinate to the co-ordinate, and from the independent to the associated, thus securing solidity and functional harmony to the diverse parts of the organism. What is found in the development of the somatic organism is present also (and that without substantial difference) in the evolution of the psychic organism, or mind. This law thus becomes the universal law of life. Life, which from monad to man is essentially the same, is only a dynamism, of which intelligence is merely the subjective side (Soury). Further, life is a phenomenon ; it is the most delicate dynamism in the universe, and is prevalent in all Nature. Intelligence is the consciousness of life, and is manifested through the wonderful mechanism of the nervous system, its grade and development corresponding to the development of this system and the associative capacity of its parts.

Psychic life commences with very simple and uncertain manifestations, and, step by step, through progressive assimilation of the forces of Nature, it rises to the most potent realization of Nature itself in the form of thought and consciousness.

Occasionally there come under our observation phenomena which appear to simulate those of the period of transition between the manifestations of the brute energies and of intelligence. It is impossible, however, to assign extent and precise limits to the conception of intelligence, nor are all agreed on this point. If by intelligence we understand the transformation of the energies of external nature into another energy in the protoplasm, and the reaction of the latter on the former, we can then also attribute to the most elementary forms of life and to the elements from which they emanate (plastiduli) the quality of intelligence. But if by intelligence we understand, not only the transformation of the cosmic energies in the dynamism of the cell—in the *chemical molecular compound*, as Danilewsky calls it—but also the consciousness of them, and the conscious reaction of the organism upon its environment, we must refuse to consider as intelligent the plastiduli, the protoplasm of the earliest representatives of life, besides the amœbæ, rhizopods, infusoria, and all the protophyta and protozoa.

Let us here understand clearly that doctrines which partake of the metaphysical, even boasting their origin from positivism, such as that which discusses the universal intelligence of matter, are entirely beyond the scope of this book.*

* The question of the earliest manifestation of intelligence, exhibited in its true limits and with great lucidity by Soury (*Revue générale des Sciences pures et appliquées*, 1895), has been taken up again recently by P. Heger, of the University of Brussels. According to him, the solution of the psychological problem is not at all to be found in the brain, but should be sought for in the study of the structure and reactions of protoplasm. Thought is a primitive and essential manifestation of protoplasmic activity. To him, as a convinced monist, the brain, so far as thought is concerned, if taken into account at all, is merely accessory. It is not the generative organ of thought,

If, under certain stimuli, the protoplasm of the amœba moves in diverse directions, thrusting out its pseudopodia or withdrawing them; if it arrests its progress on finding itself confronted by a stronger micro-organism; if it awaits the rupture of the sac of a pregnant mother in order to attack the young prey (Romanes); if some infusorians seek the light and others avoid it; if decapitated worms present certain particular attitudes under the action of light and of single luminous rays, as Graber has observed, one cannot therefore conclude that these beings have perceived and reacted in consequence. Max Verworn has expressed an opinion that many sensations of the vertebrates, such as hearing in air, do not exist in the protozoa. What falsely appears to be a sensation can easily be shown to be the effect of physico-chemical changes. If amœbæ seem sensible to noises, one cannot on that account conclude that they perceive the sonorous waves. One can reasonably contend that the mechanical vibrations of the air have changed the existing conditions of their protoplasm. If some protozoans are capable of distinguishing differences in intensity of light or colour (by the length of the luminous waves), no one can assert that these differences are properly perceived as such, and that the luminous body is recognised in the surroundings and at some distance.

If the red, violet, or orange rays modify the rapidity and direction of the movements of some bacteria, one cannot deny that these manifestations are due first to physico-chemical actions, and then to the capacity of adaptation of the protoplasm to certain conditions of existence. It is very probable, then, that the locomotor reactions observed in the protozoa, protophyta, and some invertebrates depend less on the existence of true luminous or chromatic sensations than on the thermal or chemical effects of the luminous waves. Forel, Max Verworn, and Soury have expressed such an opinion; the photodermic or dermoptic sensations, as Graber calls them, and phototropic phenomena in general, have nothing in common with the perception of objects and colours, just as the dermo-mechanic sensations of aerial vibrations and heliotropic phenomena have nothing in common with the perception of sounds and noises or of the bodies which produce them. Yet, on the other hand, they represent something absolutely new in the manifestations of organized matter—a phase of evolution preparing for perception, which makes its appearance along with the more advanced differentiation of the protoplasm. From manifestations characterized by nictitropic and heliotropic movements life advances, and is exhibited in another category of movements arising from needful variations, repeated according to habit, fixed by heredity, and reinforced by selection

though the organ indispensable for the exercise of the mental faculties. Put in this way, the question exceeds the confines of positive psychology and physiology, and enters at a bound, perhaps without the intention of the authorities concerned, the realm of metaphysics.

(Darwin). These movements, however, represent a much higher step in the ladder leading to intelligence in higher beings. They represent phases of transition in the evolutionary stages of Nature, which tends to form for itself an organ which attends to it and sums it up. Here we have a surprising phenomenon—the slow transformation of the physical forces into those of the protoplasm, and the successive transformation of the latter, according to the various dynamic agents of the universe.

When the nervous tissue becomes differentiated from the others and develops with particular characteristics, the relations of the organism to the cosmic agents become multiplied, the receptive and metabolic power of the former with respect to the latter increases, and hence the result is new adaptations and unexpected reactions, which, further, are always more complicated.

Electricity, heat, light, etc., all manifestations of organic and inorganic matter in various contingencies or particular combinations, are summed up in the nervous system, which, therefore, must realize the combinations and contingencies which, with the same laws, contribute to the manifestation of these energies. The firefly, which, by rhythmic nervous discharges, sheds its starry light on the green field, as though envious of the firmament; the gymnotus, which kills its prey or paralyzes its enemy with an electric shock, volitional in the same manner as the molecular force displayed by all beings furnished with a nervous system and muscles, are manifestations of the most marvellous phenomena by which the universe obtrudes itself upon us. A muscular contraction with its dynamic effects—kilogrammes or calories—its milliampères of electricity, its chemical changes in the muscle, the distribution of homologous and antagonistic forces whose resultant impresses a definite direction upon the movement—all these involve many principles of mechanics, and briefly comprise a volume of chemistry and physics. The discharge of light, electricity, or mechanical force is always due to the transformation of the nervous wave accumulated in the nervous tissue, which, consequently, is to be regarded as the synthesis of matter and its forces, inasmuch as the nervous system changes the cosmic energies into psychic equivalents.

The homogeneity of some of the first representatives of animal life, such as the primitive protamœbæ, in which the same substance performs digestion, assimilation, excretion, respiration, sensation, and movement; the slow differentiation of the protoplasm in the rhizopods and infusorians; the appearance of the first muscular fibre by progressive differentiation of the protoplasm in *Noctilucus miliar*, and of probably the first nerve fibre in *Stylonichia mytilus* (Engelmann); the undoubted appearance of the nerve cell in the actinians and the progressive development of the nervous system up to that of man, warrant the legitimate deduction that from simple matter the nerve cell becomes differentiated by its own intrinsic energy, and

that Nature, exerting its influence upon the cell, may create the means of attaining to the consciousness of itself.

From the first appearance, however, of the nervous system to its highest degree of development there is only a numerical, almost continuous, increase of nervous elements, with a proportionate development of the consciousness of Nature and of the relative adaptations of the organism towards its environment.

The developmental plan of the nervous system is the same as that regulating the evolution of life. At first it is only some few nerve cells which provide for the function of all parts of the small organism; then more cells, or little groups of cells more or less regularly disposed and almost independent of each other, look after

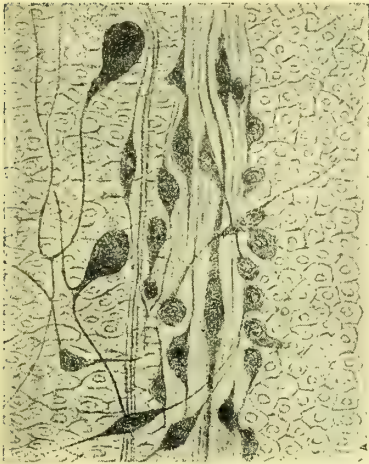


FIG. 1.—NERVOUS SYSTEM OF THE MEDUSA: SCATTERED NERVE CELLS FORMING THE SUPERIOR RING. (AFTER OSCAR AND RICHARD HERTWIG.)

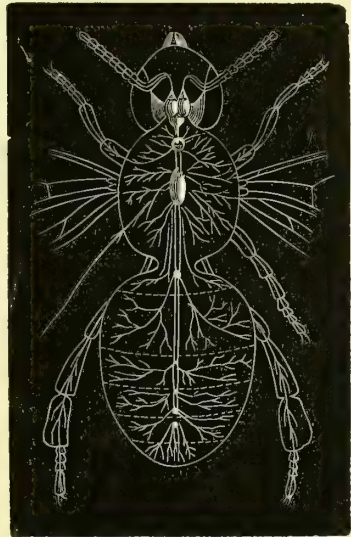
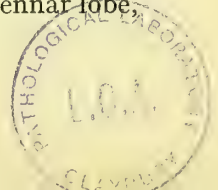


FIG. 2.—NERVOUS SYSTEM OF THE BEE. (AFTER BLANCHARD AND BEAUNIS.)

separate parts of the now larger organism, which thus becomes less homogeneous, as seen in the medusæ, which are already provided with a sensitive ectoderm innervated by a specialized nervous reticulum (Fig. 1).

The nervous system, from the medusæ and echinoderms to the higher insects—*e.g.*, ants and bees—follows a slow but progressive evolution.

In the latter, as compared with worms, crustaceans, and arachnoids, we find a great increase in the mass of nervous tissue, a greater concentration and solidity, besides a more distinct differentiation of the groups of cells, along with a higher functional grade of these, so that we are now able to speak of a central lobe, an antennar lobe, an optic lobe, pedunculate bodies, etc.



There is here diagrammatically represented the nervous system of a bee. In this figure we can observe the antennar lobes (tactile, olfactory, and perhaps auditory in function), the optic lobes situated laterally, and the pedunculate bodies, which by some—*e.g.*, Dujardin—have been considered (on doubtful grounds) the first indications of the convolutions. In the vertebrates the fusion and concentration of the nervous system are remarkable. The two chains of separate ganglia which are met with in the annelides and the worms are here fused into the spinal cord, and the antennar, optic, supra- and sub-œsophageal ganglia, etc., are, as we ascend in the scale, increasingly collected together into one single mass—the cerebrum—so as to establish more intimate associative relations with each other; but how greatly does this cerebrum still differ from that of the mammals!

The cerebrum of the vertebrates presents a new formation—the anterior brain—whose cavity communicates with that of the olfactory lobe (antennar lobe of the invertebrates) in the fishes, whose first representatives are furnished with a cerebral mantle. This mantle is merely a thin layer composed of cells bearing a strong resemblance to epithelial cells (some cyclostomata), or containing only the first hippocampal formations (myxine).

The mantle goes on developing and increasing in nerve elements in the different classes of the vertebrates till it reaches the surprising development seen in the higher mammals, in which we find it more or less superimposed on the representatives of the old ganglia—the only nerve centres of the higher invertebrates.

The development and differentiation of the cerebral mantle proceed almost uniformly, while, at the same time, the parts composing it assume closer relations and greater functional eminence according as we advance from the fish to the higher mammals, reaching the highest grade in man. In like manner we find that man himself, in continuing the story of the development of the nervous system, can add to the marvellous phenomena seen in the progressive increase, the concentration, the anatomical and functional differentiation, the closer association between parts, and the development of new formations, such as the cerebral mantle of the mammals as compared with the condition found in the inferior vertebrates (cerebral mantle absent), and the frontal lobes of man as compared with the brain of the inferior mammals.

We may infer, among other things, that these parts, being latest in appearance, sum up, in a higher order, the activity of the nervous system up to that time existent, and regulate themselves according to the supreme law of the division of labour, or distribution of offices, and exercise a regulating and directing influence on their harmonious working.

It is observed as an almost constant feature that with the increase of the nerve elements occurs a better assimilation of those influences from the outer world which we are accustomed to call

stimuli. These influences or stimuli impress on the nervous elements that functional differentiation to which is due the multiplication of ideas and adaptations by which Nature, through the medium of the nervous system, becomes known to itself.

The experimental method, extensively but rigorously applied, surprising the developing nervous system in all the stages passed through in the animal series (phylogenesis) and in the individual (ontogenesis), permits the assertion that the mind is coextensive

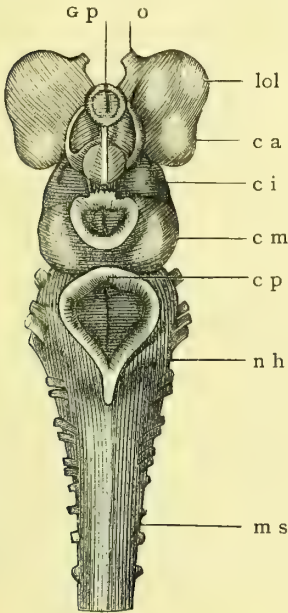


FIG. 3.—NERVOUS SYSTEM OF THE PRIMARY VERTEBRATES: BRAIN OF AMMO CETES SEEN FROM THE DORSAL ASPECT.

ca, Anterior brain; lol, olfactory lobe; o, olfactory nerve; ci, intermediate brain; gp, pineal gland; cm, mid brain; cp, posterior brain; nh, after brain; ms, spinal medulla. (From Wiedersheim.)

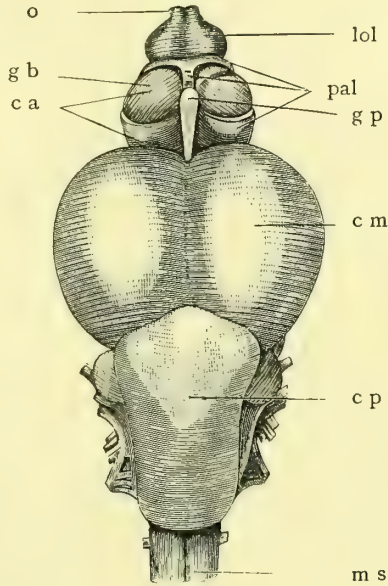


FIG. 4.—BRAIN OF SALMON SEEN FROM DORSAL ASPECT.

o, The so-called olfactory nerve; lol, olfactory lobe; pal, pallium; gb, ganglion of the base of the anterior brain; ca, anterior brain; cm, mid brain; gp, pineal gland; cp, posterior brain; ms, spinal medulla. (From Wiedersheim.)

with the nervous elements, or, in other words, with the number of notions and adequate adaptations.

Psychopathology, pursuing similar objects and proceeding backward in the process of mental analysis through all the regressive phases to its simplest formula, has succeeded in analyzing the human understanding and that of the inferior beings, and in separating one by one the elements of which it is composed. It is by this progressive mode of analysis of mind, individual as well as racial, that success in following up the evidence of the evolutionary process has been obtained. Both methods, now regarded as sure and produc-

tive branches of the science, have furnished us, in the first place, with the key whereby we arrive at the beginning of the architectural and functional plan of the brain of modern man, and, secondly, with some laws by which this marvellous structure, upon which Nature, from time immemorial, has been at work, in order that it may rule the vast dominions belonging to her, is completed and perfected.

The story of the evolution of the nervous system, whether considered in the perfect organism or constructed on the story of the development of the brain, is summarized under the following headings, which are the sure foundation of the anatomo-physiological structure :

1. The progressive increase of the nerve elements.
2. The progressive histological and functional specific differentiation.
3. The intervention of a continually increasing number of nerve elements in the work of the community, in order to furnish products more complex and more useful for the increase of the consciousness.
4. The closer association between the increasing number of nerve elements the higher the degree of function to be performed.
5. The formation of functional hierarchies in accordance with the law of the greater aptitude for the government of other functions.
6. The reservation of all the products of the cerebral offices in the great storehouses of the organic memory which furnish, with or without the knowledge of the subject, the measure of the present-day mind and the tone of the character.
7. The complete observance of the laws of organic life, besides time and space—that is to say, of the laws of the universe.

1. The Progressive Increase of the Nerve Elements.

On this point I have said all that is required. Only, to complete the proof so far as concerns the brain of the higher mammals and that of man, I would add that the researches of Broca, Reid, Peacock, Bischoff, Calori, Weissbach, and many others, at home and abroad, have clearly shown that the weight of the human brain among modern Europeans oscillates between 1,417 and 1,272 grammes, which figures prove that it is superior in weight to that of the majority of living things*—that is, in relation to the weight of the body—so that while the elephant's brain reaches a weight of 4,166 to 4,770 grammes, the bull's 400 to 700 grammes, the gorilla's 567 grammes,

* Donaldson, in an important publication ('The Growth of the Brain,' New York, 1895) raises the mean weight of the brain to 1,360 grammes in adult individuals of twenty to forty years, and of a height of 1.67 to 1.72 metres. These, naturally, are mean figures.

It is well to bear in mind that there is a great individual variety, not easy of explanation, recollecting that the brain of Gambetta weighed 1,000 grammes, that of Turchineff, on the other hand, 2,012, while it is no rare thing to find ordinary workmen with a brain weighing 2,000 grammes.

the whale's 3,000 grammes, still, the proportion of brain to body-weight in the young elephant is 1:500, in the ox from 1:500 to 1:800, and in the adult gorilla 1:100, while in man it is 1:36:58.

On the other hand, it is known that the brain weight of Europeans exceeds that of the African negroes by 12 per cent. (Broca), and by even more that of the aboriginal Australians and Bushmen.

The increase occurs in greater proportion in those parts of the brain which are latest in appearance—that is, in the cerebral mantle, which, little by little, assumes an enormous size and weight in comparison with the posterior and after brains, relatively much more developed than the hemispheres in the inferior vertebrates. It is sufficient to give here one example. The hemispheres, which in some of the lowest vertebrates are composed of a simple thin membrane, reach in man 1,157 grammes, while the cerebellum weighs 142 grammes and the medulla oblongata hardly 26.5 grammes.

On the other hand, the number of nervous elements increases in an extraordinary manner, seeing that the gray substance of the human hemisphere is not only much thicker than in other brains, but is also beyond comparison more extensive, by the formation of folds and sulci of a notable depth.

With the attainment of the gray substance of the cerebral mantle to such extraordinary proportions, the number of cells, according to Meynert, rises to as many as 612,000,000; according to Donaldson, with approximate calculations, to 1,200,000,000; and according to Hammarberg* to 9,200,000,000. Their diverse forms and dispositions give us good reason to suspect that their physiological mechanism and their functional attributes may equally vary, and that they offer, therefore, conditions most favourable for development in this new sphere, possessing still unexplored divisions of the great intellectual tree, nourished by all the forces of Nature.

2. *Progressive Specific Differentiation from the General to the Particular, from the Simple to the Complex.*
3. *Intervention of an always increasing Number of Nerve Elements in the Work of the Community, in Order to furnish Products more Complex and more Useful for the Increase of the Consciousness.*

To demonstrate these two propositions, I shall have recourse to two examples—one from Huxley, which will render more apparent the objective truth contained in them.

The savage who, confronted by an enemy, uses a club for self-defence, and a fencing-master in modern civil society who, in identical conditions, uses the sword, both bring into action for the same object the same muscles of the upper limb.

While, however, the savage executes coarse movements, making

* 'Studien über Klinik und Pathologie der Idiotie nebst Untersuchungen über die normale Anat. der Hirnrinde.' Upsala, 1895.

a useless expenditure of his energy, the fencing-master, more composed, performs a series of very delicate movements, each having its proper why and wherefore, and all co-ordinated with precise judgment, and in wonderful harmony with the two objects of attack and defence. Again, the savage, not knowing how, cannot employ other more adequate movements for the attainment of the object which he has in view, while the fencing-master can perform in addition those of the savage, the aimlessness and inferiority of which, however, he recognises.

In the fencing-master a functional differentiation has occurred in the motor cells of the cortex of the right upper limb, and new associations have been formed by the intervention of cells which perhaps have till now remained inactive, the result being a more complex and better co-ordinated product.

Suppose now that the fencing-master lays down the sword and takes up the pen to describe his thrusts and parries. It is easy to understand that a marvellous development must have been achieved by his brain and that a more delicate co-ordination, based upon new and more complex associations, must have been rendered possible to the same muscles in him as were employed by the savage, so as to enable the fencing-master to put down on paper the graphic symbols of the movements executed by him, and of all the exciting episodes of the assaults.

In this case the intervention of a greater number of coefficients must necessarily take place. Among these a new importance is assumed by the following :—the expression of the movements and instruments in words ; the formation of auditory and visual images of the words with which he intends to express his thoughts and emotions, and the translation of the images of the words into graphic symbols. These images are furnished by other cerebral cells which did not come into play at all in the fencing-master's movements of attack and defence.

This clearly shows that to obtain a wider co-ordination of movements and to attain a higher grade of motor function it is requisite that there be not only differentiation of the same organs of the cerebral cortex, but also the indispensable assistance of other factors, or, as one might say, the work of special workmen : division of labour and co-ordination of the workers.

Another example may be brought forward : the visual organ appears in the lower animals, even in some protozoa (Pouchet, Engelmann) as the so-called ocular spots, composed of pigmented cells which have the property of fixing light, and are in turn covered by a refracting substance which by its disposition and form concentrates and directs the light. The ocular spots in other higher series of animals—*e.g.*, the more developed medusæ—are not only covered by refracting media, but reach a notable degree of organization.

These eyes, although still simple, by the aid of a more or less limited number of retinal rod cells (in some arachnoids) assume relations with small ganglionic groups, these becoming, in the course of succeeding developments, the optic ganglia of the insects and the optic lobes as met with in the vertebrates (reptiles, birds, etc.). In mammals, in addition to the optic lobes which furnish some factors indispensable for vision—perfected as it is in them—we find in the cerebral mantle, and this especially in the higher mammals, a visual area entirely new and distinct from the motor, tactile, and auditory areas. Meanwhile, the numerous eyes of some insects do not furnish such a perfect vision as the eyes of the higher mammals; their sight is of a low grade, and probably lacks the power of accommodation (Lubbock) and of distinguishing the contour of objects (Forel).

In birds and mammals sight becomes increasingly more perfect, and one region of the cerebral mantle becomes always more differentiated from the others, for the visual function.

In man one finds the visual area not only much extended, but also highly differentiated as compared with that of reptiles, birds, and even higher mammals.

It is by its greater development and its progressive differentiation that the brain of man possesses that which is barely outlined in the brain of birds, and which is only a little more evident in that of mammals—viz., the visual area, which, like all the other areas, is functionally distinct and differentiated into so many different areas. Thus, there are areas for the sensation of light and colour, form and volume; others for the concrete images of objects, for locality, and, lastly, for the graphic images of speech.

Indeed, it is through the last-named that man is able with his sight to sum up so great a part of Nature, and reproduce it not only with the artist's colours, but also with words which reflect Nature in a psychic form so brilliant as Byron, Leopardi, and many others have done.

4. *The Closer Association between the increasing Number of Nerve-Elements the Higher the Grade of the Function to be fulfilled.*

Such a marvellous result as the above—the differentiation, on the one hand, and the great complexity of the products of action of the cerebral cells on the other—would not be possible did there not exist associative paths which open up innumerable communications between the millions of cells—which are so many units of specific energies—or between the nervous reticula in such a number of combinations as is almost beyond the possibility of calculation. By means of these paths every brain cell can put itself in direct or indirect relation with all the others, not only of the cortex, but of all the vast dominions of the nervous system.

One may judge what a wealth of communications a group of nerve cells calls into play in order to invoke, under the influence of one stimulus, the co-operation of others, and still others, so as to bring forth the highest products of the understanding which are possible through the association of cell labour.

The staining methods of Golgi, Cajal, Nissl, and Apaty demonstrate vividly the wealth of associative paths formed by means of the protoplasmic and axis-cylinder processes.* The number and arborizations of the protoplasmic processes increase with the degree of evolution of the animal species.

5. *The Formation of Functional Hierarchies on the General Law of Greater Aptitude for Government of the other Functions.*

The work, however, is not equally distributed over all the cerebral workers. Some of them are assigned a special office, and they, by the nature of this office, exercise a preponderating influence upon all the others concerned in a complex function.

I entrust the demonstration of this assertion to an example which I have culled from the physiopathology of language, because I find no other source which has equally close connections with the intellect.

Speech, which assumes a significance sometimes sublime, sometimes arbitrary, in the mind of the poet, theologian, and metaphysician, has been reduced to its elements by the pathologist, and we have come to know that it is one of the most complex products of the combined labour of the brain, which here acts, not as a functional unit, but as the synthetizer of the specialized products of many of its parts. Speech supposes a preformed conception of what one wishes to express, and in the formation of this conception there co-operate an immense number of cells of different sensory and motor areas of the cortex, besides those sometimes of the frontal lobes, the auditory, visual, and kinæsthetic images of each word pronounced, the motor discharge from the motor centre of articulation, and the graphic discharge from the motor centre of writing. All these images or senso-motor components of speech possess their respective centres in the cerebral cortex, each distinct from the other. As the majority of men learn to speak by hearing—that is, by receiving and fixing the acoustic images of the words pronounced by others—the differentiation of a centre for the images in the auditory area of the cerebral cortex proceeds in concert with the formation of a centre differentiated for the articulation of words, and much

* Such a general question as this is but little affected by the discussion now raging—in consequence of the works of Apaty, Bethe, Held, on the one side, and Cajal and Van Gehuchten on the other—around the doctrine of the neurone in the sense of Waldeyer, or the nervous reticulum according to Apaty.

precedes that of a centre for reading and another for writing. The first (centre for acoustic images), being the oldest, is consequently the most stable in organization. The last two centres (reading and writing), which are differentiated on more or less remote areas of the brain, are subordinate to the centre for the acoustic images of speech. Accordingly, while a lesion of either of these last-named centres gives rise to suppression of the specific function of that centre only, and to little or no extent disturbs that of the others, a lesion of the centre for the acoustic images of speech suppresses not only its own specific function, but interdicts or disturbs that of all others taking part in the formation of speech. Seeing also that language is spoken before it is written, the centre for writing is subordinate to that for articulate speech. The latter being destroyed, the former ceases to functionate (Lichtheim). Biology, then, has succeeded in discovering not only the law of division of labour in the development of the brain, but also that of the different hierarchical dignity of some in the function of the whole.

In psychic life, in proportion as the mental capital of ideas and aptitudes increases, the marvellous functional mechanism adds to its complication by introducing new functions which co-ordinate themselves with those pre-existing, in order to furnish a more complex product. The more numerous, associated, and educated, the diverse factors from which it emanates, the higher is the dignity of the function. Thus, simple sensations combine in the process of perception. From the perceptions, and always by way of association of the recent products with the older perceptions, we arrive at concrete notions, and from these, step by step, at the highest abstractions to which the human mind can attain. Personality, as we shall see in another part of this work, is only the product of the physiological fusion of all the functions of life synthetized and summarized by the nervous system.

When man of the sensory type advances to that of the conceptive, it is from the latter side that the government of the sensory sphere arises. The conceptions are like centres of planetary systems surrounded and followed in their orbital course by a greater or less number of satellites (secondary conceptions and concrete images), whose movements are regulated by the greater star, so long as they are not, by reason of decompositions and recompositions, established as new ideative systems, which in their turn regulate the motion of their respective satellites.

A great number of mental affections are the consequences of the infringement of the law of association and physiological fusion of the products of individual parts of the nervous system, and of the suppression of the regulative influence in those parts of the mantle which have attained the highest rank of synthetizing and regulating the function of the other parts.

6. *The Reservation of all Products of the Cerebral Functions in the Great Storehouses of the Memory.*

One of the most important and fundamental functions of the brain is the securing, in the great storehouses of the organic memory on which the extent and quality of the mind and character depend, of a reserve of all the products of the cerebral functions.

A large number of facts elucidated by careful observations in hypnotic and subhypnotic states, besides the most diverse forms of insanity, demonstrate clearly that mind is not co-extensive with consciousness.

The perceptions, their associations and reactions, possess a strong intrinsic influence, outside the realms of consciousness, on the constitution and manifestation of the personality, just as atoms of carbon, oxygen, hydrogen, and nitrogen possess the affinity for forming an organic molecule.

We might imagine consciousness to be a luminous field, relatively small and traversed in a unit of time by a somewhat limited number of mental components—perceptions, emotions, reactions, and associated and combined products which, however, are in constant motion.

A series of stimuli operating, and a nervous system receiving, registering, transmitting, and associating impressions, are essential conditions to the acquirement of a mental product. In order to arouse a state of consciousness, however, there is requisite a certain degree of intensity of stimulation, external or internal, or the repetition of a weaker stimulus, so that these, being aggregated, may enter upon the consciousness. Throughout the whole realm of Nature there is nothing which, acting on the nervous system, is absolutely incapable of producing an effect. Even the feeblest agents determine minimal modifications with a tendency to enter the field of consciousness. On the other hand, the sensations, besides autochthonous products of associations, either do not reach the field of consciousness, or occupy it only for a short time; then, as they are succeeded by new sensations which reach the threshold, they are driven into subconsciousness and thence into unconsciousness.

Each idea, meanwhile, like each emotion, has contracted indissoluble relations with the organic *ego*, and in passing into the unconsciousness carries with it, in a state of latency, a certain quantity of the light of consciousness and a tendency to return into the field of the latter; the more impressive its first incursion upon the consciousness, the longer its stay there, the more light absorbed and drawn with it in passing into the unconsciousness, and the more numerous and powerful the associations contracted with the organic *ego* and with the present and past of the psycho-organic personality, the stronger is its tendency to return. These ideas and emotions form the preconscious sphere, and furnish to the personality the

points of rendezvous and departure. It is important to note that objects and their relations, synchronous or successive, pass into the unconsciousness in the same order as they exist in Nature (Spencer) and as they cross the field of consciousness ; and in their combinations they are regulated by the laws of affinity and of contrast, so that new sensations, similar, dissimilar, analogous, and contrasting, may recall from the unconsciousness all those others which once or oftener have had passage there. Hence the wider association and the progressive augmentation of the psychic personality which takes root in the unconsciousness and nourishes itself from it. Since, however, the unconsciousness is composed, not only of the products elaborated by the individual, but also of those elaborated by the racial ancestors, although the brain inherits those ancestral dispositions (associations of cell groups formed by exercise), it is easy to understand what extensive organization is possible, in the wide realms of the unconsciousness, between the present and past of the individual and the past of the race, and how it is possible that from such an extensive association there may be released so much light that the consciousness of the individual is itself sometimes thereby surprised. One of the sensory factors of a complex product of the understanding may have traversed the field of consciousness in a state of simplicity, or may always have remained outside it, associating itself by its inherent nature with the individual or atavistic residua. In any case, it is evident that, even although the outer world, intruding itself upon and augmenting the consciousness with its infinite stimuli, drive back into the unconsciousness the story of the individual, still, it is always the latter which bestows the greater brilliancy upon the consciousness.

The historical order in the disposition of the contents of the great archives of the unconsciousness, the ever-observed law of the affinity of the constituent elements in the unconscious processes of decomposition and recombination, the readiness to furnish the historical details of the personality when demanded by the consciousness or the environment, are indispensable conditions of psychic life, departure from which gives rise to mental disorder.

7. The Complete Observance of the Laws of Organic Life, etc.

Life is maintained by organic integration and disintegration ; molecules are assimilated from without, and take the place of others which become eliminated. Those organisms which assimilate more easily and eliminate more readily the products of organic disintegration have the higher life. This fact and law has its counterpart in psychic life also. Of the large number of impressions arriving at the receptive centres, and perceived or transformed in the great central crucible of the psychic workshop ; of all that world of atoms which constitute the Milky Way

of the mind, always in process of formation, only some are utilized by and incorporated in the mind, which through these is ever advancing further in the consciousness of the universe. If, however, these impressions, which are useless or dangerous, be not eliminated from the field of the consciousness, but accumulate there, they encumber it, impede its regular action, and succeed in poisoning the mental organism. These impressions, useless or dangerous to the personality, arriving at a point in the perception destitute of assimilable elements and of any formative power whatsoever, or at the most possessing but a scant one, soon become eliminated by the intrinsic virtue of the consciousness. How many evolutions of the spirit belonging to the long period of childhood and youth, which respond no longer to the degree of evolution of maturity, become hidden in the shades of the unconsciousness! To how many once-enacted scenes that now offend our modern sense of ethics do we refuse to give countenance! All these psychic components, which we may liken to the meteors of the mental universe, no longer form an active part of our mind, and either no longer cross the field of consciousness, or else pass the threshold of perception at a tangent and disappear (elimination).

Just as our organism takes from the outer world the assimilable matter by which it commences to develop, and by which it is ultimately perfected, transforming it in a thousand ways, so the understanding is nourished and developed by the forces, infinite, various, and capricious, which emanate from Nature.

In the physical organization disintegration and assimilation of the material from without takes place in contact with that forming the organism. In the mental organism those mental formations of which the personality is already constituted are broken up and reconstructed under the influence of new acquisitions. The series of chemical products ranges from simple bodies to protagon; psychic products from the simplest sensations to the most abstract conceptions. The body eliminates all the waste products, and restores to the earth the useless material introduced; the mind eliminates all the useless elements of psychic compositions and decompositions, and thrusts away into the realms of the unconsciousness those which are not in harmony with its life and with its further development in relation to the environment.

The active nuclei of the personality, those which most reflect nature and environment in the historical moment of their existence, exercise a true phagocytic power on those others which arrive there like detritus from the great forge of thought in the social and physical environment. Those in whose consciousness this phagocytic and eliminating power is defective—who receive into their consciousness all that falls under their senses, or the useless products of decomposition and recomposition, resemble pulpy organisms impoverished by parasiticism and enfeebled by slow, insidious poisoning.

Those useless mental products and hurtful perceptions which instal themselves, accumulating, chasing one another, and dominating the consciousness, destroy the balance of mental life, and interfere with the course of thought, feeling, and action.

One somewhat large class of psychic disorders is represented by hereditary or acquired incapacity to free one's self from the perceptions, thoughts, emotions, and actions which are useless and opposed to the consciousness. These furnish the proof of the fundamental law of psychic life.

The most fundamental laws of mechanics and of physics agree with those of psychic life. Let us take, for example, the law that velocity is in direct ratio to the excito-motor force (initial velocity) and in inverse ratio to the resistance. This can be psychologically demonstrated thus: a vigorous idea, an intense desire, a strong sentiment, can earn the reward denied to the man whose thought is feeble, whose desire is weak, whose sentiment is exhausted (by greater rapidity or velocity of the action).

Let us take one other example from the electric battery. We know that the intensity of the current is in inverse ratio to the resistance and in direct ratio to the electro-motor force.

The resistance in the electric battery is both internal and external. The external belongs to the larger circuit and the internal to the battery itself (smaller circuit). In the manifestations of the mental being we can likewise recognise two forms of resistance—the external and the internal. The external resistance reaches us from the environment, the internal is met with in our consciousness. It is easy to understand the external resistance. Every action, from the most simple (any act of prehension) to the most complex (a scientific research, a colonial enterprise), has implied in it the conception of resistance. That the internal resistance is in inverse ratio to the excito-motor force is proved by the fact that a difficulty is more apparent to the old and feeble than to the young and vigorous.

The loss of self-confidence at the moment one is preparing for an undertaking, or the intrusion of other psychic components, especially the emotions (fear), induces a diminution in the rapidity of the action, even to the point of arrest. It is by the same principle that compression and obstruction of a bloodvessel, arterial or venous, lead to slowing and arrest of the blood-current, even to the point of thrombosis. The velocity under equal conditions is in inverse ratio to the weight.

If small desires and obvious ideas find ready actualization, great conceptions and high sentiments require a long time, and often the produce of many brains and many generations, to reach the standard of universal knowledge.

The useful product of labour is in combined ratio to the excito-

motor force, the resistance overcome, and the weight transferred. The law of the ramification of a current into different conductors, or of a column of water into various tubes of different diameter, and the laws of resistance, all have their representatives in the mental mechanism, and have furnished to Wundt the subject-matter of one of the most acceptable, though somewhat abstruse, books—‘*Die Mechanik der Nerven und Nervencentren*.’

If a liquid which flows in a tube under a given pressure becomes distributed in several tubes, the velocity diminishes in proportion to the number and diameter of the tubes. In like manner, the intensity of the electric current is altered if it becomes spread over various conductors. The analogous law regulating the phenomena of mental life can always be recognised; more quickly and surely does he attain the end of his individual exertions who, under equal conditions, knows how to collect all the energies at his disposal, and direct them on the object of his desires. The individual who dissipates energy in wavering and doubt (internal resistance), because deficient in ready perception of the end, the means, and the consciousness of the energies at his own disposal, and who through fear exaggerates to himself the extent and nature of the difficulties and dangers, will be a laggard on whom the fortune of victory will never smile.

A large class of affections is met with in individuals who see only obstacles, who feel only difficulties; weak-minded and worthless, they yield to the slightest stress. They are weak and cowardly, and sometimes call themselves prudent; tormented and swayed incessantly by doubt, they squander their already much weakened psychic energies (cerebrasthenia) in those internal struggles.

Another law of psychic life is the harmony of the reciprocal relations existing between body and mind.

That the psychic function is grafted upon the great trunk of the organic functions, and is affected by all the modifications which occur therein, is demonstrated by the fact that all the organic alterations have their equivalents in the nervous system and the psychic personality.

The mind adapts itself variously, according to the alterations in the external and internal conditions; humour and disposition change through physical pain, through the exhaustion of functional anomaly of an organ, as, for example, the stomach. There are few disorders of the molecular interchange which do not produce more or less notable and significant disturbances in the psychic sphere—change of humour (sadness, ennui, melancholy), altered mental disposition (unaccustomed rudeness, lessened communicativeness, colder friendship), diminished aptitude for work, increased or lessened affectivity. It is sufficient to mention diabetes, the uric acid diathesis, oxaluria, etc. Sometimes, when the individual himself, by his strong mental organization, does not show moral and intellec-

tual changes worthy of consideration, such are manifested in the offspring. In this connection it is a highly significant fact that in many families the psycho-physical degeneration arises from an altered chemistry in the ancestors. The old physicians had already noted for a long time that many neuropsychic forms (neuralgia, etc.) originated in the gouty diathesis. Many to-day recognise a uric acid or arthritic genesis of progressive paralysis of epilepsy, etc.

It will be sufficient to mention the psychic impoverishment of the jaundiced; the dementia of the subjects of myxœdema (thyropravia); the imperfections and the frequent failure of the highest mental products in individuals slightly alcoholized; psychic paralyses which may progress with the gradual dissolution of the personality up to complete abolition of the mind in coma; the excited imagination of one under the influence of coffee or tea for the first time; the depression of all the energies of the neurasthénic, during the long hours of digestion, by absorption of anomalous products of a disordered digestion—these examples are sufficient to make us appreciate thoroughly the reciprocal dependency and the important bearing of the functions of the material interchange upon the psychic functions. We accordingly find here great variety in susceptibility—strongly-organized individuals whose personal, intellectual, and moral nuclei are incapable of decomposition, and who pass through the most diverse circumstances, external and internal, preserving always the same figure; others, composed of more unstable components, which become decomposed at every action of new factors, internal and external, on this account appear extremely changeable. The latter can be arranged in series from the opportunists of life to the inconclusives. Not only are the changes in the former not confirmed, but rather should we say that they do not become evident, because they do not overcome the strong affinity of the stable and refractory compounds of the well-constituted personality. But wherever an organic change occurs it alters something in the complexity of the psychic personality, which may cross the threshold of consciousness, be reflected upon the physiognomy and on the muscular and mental disposition, and be noticed by others; this does not arouse particular states of consciousness and sensible alterations.

The organic sphere and its constitution are reflected in the psychic sphere so far as regards the disposition and tone of the mind. Want of harmony of the body, and especially asymmetry of the brain, are transcribed as discords and asymmetries of psychic life. The extirpation of any organ whatever induces a modification in the extent and disposition of the psychic personality. Castration in the male or oöphorectomy in the female changes the aspect and character of the unfortunate being. Not infrequently a certain slow alteration is likewise to be met with in those who in adult life have lost a limb. I have not seen anyone perfectly constituted, intellec-

tually and morally, among those who presented a congenital deformity of one of the limbs. This does not conflict with any possible exception. Such a fact has been confirmed by anatomico-pathological observations, either of agenesis of a given part of the brain in relation to the arrest of development of a limb, or of those cases in which a disease of infancy which suppresses or paralyzes a limb (as in acute poliomyelitis of infancy) induces atrophy of the corresponding part of the cerebral cortex. The corporal asymmetry finds its counterpart in an analogous cerebral asymmetry which in its turn betrays itself as a psychic asymmetry, the most classic manifestation of which is epilepsy.

If we examine the question from another side, we shall find the most perfect correspondence between the psychic and somatic phenomena of a great number of nervous affections. The instant nature of the common epileptic attack finds a counterpart in the impulsive nature of the character of the epileptic, the wild cry of the ordinary accession in the savage act of the psychic accession. The nervous and unconscious discharge of the convulsion itself is worthy of the terrifying hallucination, or a blood-curdling thought as of fifty poniard stabs being inflicted upon an innocent victim. Unconsciousness is present in all these manifestations which are equivalents. The cerebral asymmetry and the psycho-somatic degeneration are the common substratum; hatred of God and man, cloaked by religion and reverence, is common to all the forms.

The same thing is observed in hysteria. Here we meet with two orders of symptoms—somatic and psychic. Both are characterized by the same feature—mobility. To-day there is anæsthesia of an entire side, to-morrow of a limb only; another day of yet another part of the body. It may vary in intensity, or it may be that one kind of sensibility only is defective; frequently such hysterical disorders alternate capriciously.

One fancy induces paralysis, another will cause it to disappear and will produce contracture. A misfortune, a shock, a blow, an emotion, an insinuating suggestion, a strict command, can dispel or reproduce the most varied symptoms.

The mind behaves in like manner. High spirits and low spirits succeed one another, and alternate without objective cause; laughing and weeping, confidence and diffidence, sympathy and antipathy, love and hatred, truth and falsehood, simulation and dissimulation, enthusiasm, heroism, misanthropy, emerge from hysteria in a kind of animated merry-go-round in which men and things are frequently involved, and which displays itself in forms varying from the ecstasy of Saint Theresa or the heroism of Joan of Arc to the simulation of Madame X. and of Count Paolo. These two forms of hysteria, the somatic and the psychic, coexist, succeed one another, and alternate time and again.

The same thing occurs in the common chorea of Sydenham.

The disturbances characterizing this affection are common, in different proportion, to body and mind. Inco-ordinate and purposeless muscular explosions exist alongside emotional, volitional, or ideative explosions; a series of choreic feints are superimposed upon a series of psychic attitudes with which they are in strict relation.

Emotional flashes, isolated and fleeting thoughts, destitute of association, like many-coloured soap-bubbles blown in the air; volitional impulses and psychic arrests; oases and deserts in the consciousness, which is disturbed and entirely upset—such is the picture of the choreic. Just as no movement is co-ordinated and rational, and capable of attaining a preconceived end, so no thought expresses a purpose, no mentalization is the reflex of external circumstances. The entire being, with the relations, from the most elementary movement to the most complex conception of which the individual is capable, is unstable, and sometimes dispersed in a series of useless and valueless products which have all the same signification—the temporary liquefaction of the nervous system in its twofold and correlative manifestation of somatic and psychic functions.

PART I

CHAPTER I

ANATOMICAL SKETCH OF THE CEREBRAL MANTLE AND OF THE SUBMANTELLAR WHITE SUBSTANCE

I HAVE mentioned in the Introduction that the cerebral mantle possesses quite a long story of development. From that of the primary vertebrates, which, in comparison with the human mantle, contains few cells, it becomes gradually, not only more complicated, but, above all, richer in anatomical components, with an accompanying formation of convolutions and the appearance of nerve elements of various forms and dispositions.

This is not the place to describe in great detail all the phases of the development of the mantle, either throughout the zoological orders or in its various grades of evolution in the human subject, from the appearance of the anterior vesicle to the full development of the brain. The sole object of the first part of this book is to expound, in the most condensed and synthetic manner, the mechanism whereby the brain fulfils its function, and for a clear notion of this we must have a knowledge of the cerebral architecture, at least in its general lines. By following this plan, the semeiology of the mental affections and the clinical forms which these assume will find their surest and most rational explanation altogether beyond the confines of clinical empiricism.

A section through the cerebral peduncles, as far as possible in front of their insertion into the pons, and another longitudinal section in the median line of the corpus callosum, divide the cerebral hemispheres or anterior brain (including the intermediate brain [optic thalamus]) from the mid brain (corpora quadrigemina) and the posterior brain (and after brain). The cerebral hemispheres present three aspects, each of which is divisible into more or less definite anatomical provinces, and also into physiological provinces which are not so well defined. These two provinces do not coincide with one another, and therefore we shall briefly describe the former, and adopt the simplest method of arriving at a knowledge of the latter.

EXTERNAL ASPECT OF THE CEREBRAL HEMISPHERE

Here we can distinguish four anatomical provinces separated by deep sulci or fissures—the fissure of Sylvius, the fissure of Rolando, and the occipito-parietal fissure. Of the four resulting anatomical provinces, one—the frontal province—is neatly and precisely defined; the other three can be distinguished only by extending the given fissures as imaginary lines in definite directions. The three provinces distinguished in this last-named manner are the parietal, the temporal, and the occipital.

FRONTAL REGION OR PROVINCE.—This is well defined below by the fissure of Sylvius, behind by the fissure of Rolando or *sulcus centralis*, and above by the superior margin of the hemisphere. It is composed of four convolutions:

1. *The ascending frontal convolution (gyrus centralis anterior)* is situated between the fissure of Rolando and the prefrontal sulcus (*sulcus precentralis*), and extends upwards to the superior margin of the hemisphere, and downwards to the fissure of Sylvius, where it contributes to the formation of the frontal operculum.

2. *The superior frontal convolution (gyrus frontalis superior)*, commencing at the inferior aspect of the hemisphere, where we shall meet it again, contributes to the formation of the frontal pole, and, following the curve of the hemisphere between the interhemispheric margin, which bounds it along its whole length, and the superior frontal sulcus (*sulcus frontalis superior*), which separates it from the convolution below, it joins, after broadening out, the ascending frontal convolution (foot or *pes* of the superior frontal convolution).

Sometimes the *pes* is separated from the ascending frontal convolution by a sulcus (*sulcus prefrontalis superior*).

3. *The middle frontal convolution (gyrus frontalis medius)* takes part also in the formation of the frontal poles; it follows, with a shorter radius, the curve of the superior frontal, from which it is separated by the superior frontal sulcus; finally, it terminates in a broad base (*pes*) at the ascending frontal convolution, from which it is separated for a considerable distance by the superior prefrontal sulcus (*sulcus precentralis superior*), and is distinguished from the inferior frontal convolution by means of the inferior frontal sulcus.

4. *The inferior frontal convolution* joins the inferior part of the ascending frontal with which it is in continuation in the opercular region (*pes*). It exactly embraces, with its foot folded back on its inferior margin, the ascending branch of the fissure of Sylvius. It is limited inferiorly by the fissure of Sylvius; in front it forms the rounded extremity whereby the external face becomes continuous with the orbital surface of the hemisphere, and assists also in the formation of the frontal pole along with the other two convolutions; from the middle frontal convolution it is separated by the inferior frontal sulcus (*sulcus frontalis inferior*).

PARIETAL REGION OR PROVINCE.—To this province we can assign the following boundaries : In front, the fissure of Rolando ; above, the superior hemispheric margin included between the fissures of Rolando and the occipito-parietal fissure (*sulcus parieto-occipitalis*); below, from before backwards by (1) the fissure of Sylvius where it runs horizontally, (2) an imaginary line which represents its prolongation backwards to a point of junction with the lateral occipital sulcus, and (3) a portion of the latter, having likewise a horizontal direction and usually found in line with the horizontal part of the fissure of Sylvius ; behind, the province is bounded by (a) the inferior portion of the interparietal sulcus, considered by some anatomists a distinct anterior occipital sulcus, but which in the majority of brains is continuous with the interparietal sulcus ; and

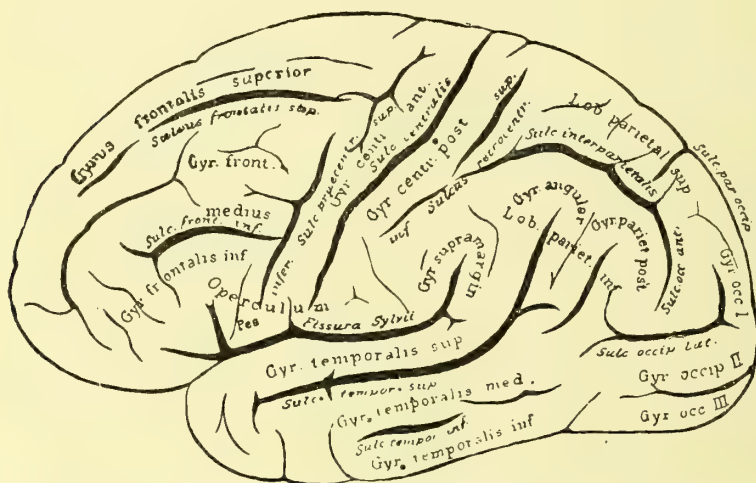


FIG. 5.—EXTERNAL ASPECT OF THE CEREBRAL HEMISPHERE.

by (b) the occipito-parietal fissure and its imaginary prolongation to meet the interparietal fissure.

All this extensive province may be divided into various convolutions and lobes :

1. *The ascending parietal convolution, or gyrus centralis posterior*, is separated in front from the frontal lobe by the fissure of Rolando, and is parallel to the ascending frontal convolution, whilst behind it is distinguished from the remaining part of the parietal lobe by the post-Rolandic sulcus, or *sulcus retrocentralis*, not always well developed in its whole length ; above, it reaches the interhemispheric border ; below, it forms the parietal operculum, a posterior continuation of the frontal. The rest of the parietal region is divided into two parts by the interparietal sulcus (*sulcus interparietalis*), which forms a marked curve with its convexity looking downwards and forwards.

2. *The superior parietal lobule*, comprising what existed above

the sulcus mentioned, is well delimited by the interhemispheric margin above, the interparietal sulcus below, the post-Rolandic sulcus in front (*sulcus retrocentralis*), and the occipito-parietal fissure behind.

3. *The inferior parietal lobule* consists of the remainder of the parietal region below the sulcus interparietalis, and its limits in front, behind, and below are those already assigned to the parietal region. This lobule is by some divided into two, and by others into three, convolutions :

(a) *The supramarginal convolution* (*gyrus supramarginalis*), embracing the ascending branch of the fissure of Sylvius ; more behind and above is found—

(b) *The angular convolution* or *gyrus* (*gyrus angularis*), which

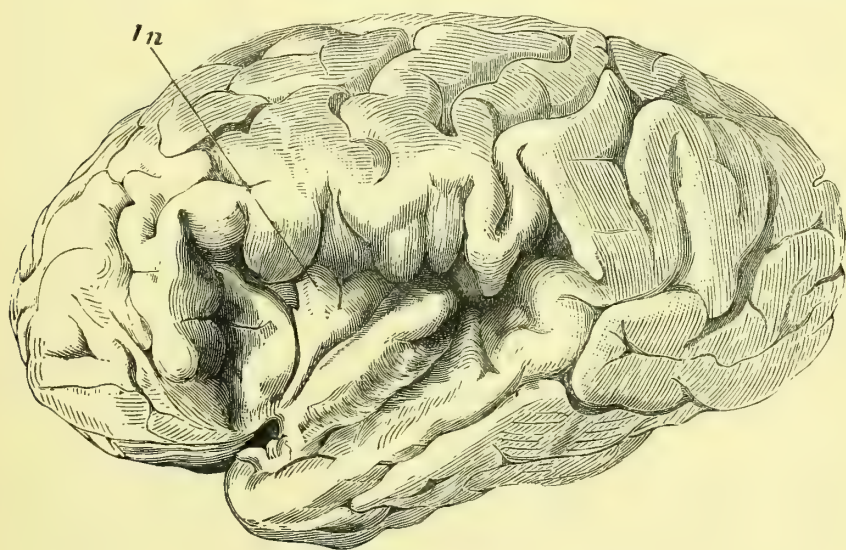


FIG. 6.—INSULA (AT THE BOTTOM OF THE EXPOSED FISSURE OF SYLVIVS).

embraces the ascending branch of the superior temporal sulcus (or parallel sulcus, according to some anatomists).

(c) *The posterior parietal convolution* or *gyrus* (*gyrus parietalis posterior*), which, according to some (Edinger), is a distinct convolution, but according to others forms a single convolution in combination with the angular gyrus (Dejerine and others).

TEMPORAL REGION OR PROVINCE.—This is well limited above for its anterior two-thirds by the fissure of Sylvius, below by the margin of the hemisphere. In front it forms the temporo-sphenoidal pole, but has no precise limits behind and above or posteriorly, where it is fused with the parietal and occipital regions. We have already mentioned the imaginary line which divides the temporal region above and behind from the parietal ; behind, as the line of limitation, we might imagine one representing the prolongation

of the anterior occipital sulcus (*sulcus occipitalis anterior*) to a point of junction with the preoccipital notch. This region is divisible into three convolutions, recognisable in almost all brains.

1. *The superior temporal convolution (gyrus temporalis superior)*, situated between the fissure of Sylvius above and the superior temporal sulcus below (*sulcus temporalis superior*).

2. *The middle temporal convolution (gyrus temporalis medius)*, situated between the superior temporal sulcus and the inferior temporal sulcus (*sulcus temporalis inferior*), which separates it from—

3. *The inferior temporal convolution (gyrus temporalis inferior)*, situated below the given sulcus and forming the inferior border of the hemisphere. All those three convolutions enter into the formation of the temporo-sphenoidal pole, and, leaving out the imaginary line, become fused posteriorly with the inferior parietal lobule and with—

THE OCCIPITAL REGION.—This is limited in front by the sulci and imaginary lines described as the posterior boundary of the parietal and temporal regions; behind and below by the margin of the hemisphere. Three convolutions take part in its formation:

1. *The first occipital convolution (gyrus occipitalis I.)*, which is bounded by the anterior occipital sulcus in front, the interhemispheric border behind, the occipito-parietal fissure above, and the occipito-lateral sulcus below. Its direction is almost vertical.

2. *The second occipital convolution (gyrus occipitalis II.)* is situated almost horizontally between the lateral occipital sulcus above (*sulcus occipitalis lateralis*) and the inferior occipital sulcus below (second occipital sulcus of some anatomists), being separated by it from—

3. *The third occipital convolution (gyrus occipitalis III.)*, also situated almost horizontally, and forming the inferior border of the hemisphere, as far as the preoccipital sulcus, which separates it in front from the inferior temporal convolution.

On exposing the fissure of Sylvius by depressing the temporal lobe anteriorly and raising the fronto-parietal operculum, another region, quite hidden in well-developed brains, and forming the floor of the fissure, comes into view. It consists of from five to seven small, almost rudimentary, convolutions, disposed like a fan in a direction almost oblique from below upwards. This province, of great importance from a physiological point of view, is the so-called *insula* (Fig. 6).

INTERNAL ASPECT OF THE CEREBRAL HEMISPHERE

On the internal face of the hemisphere we can distinguish with precision a fronto-parietal region, a limbohippo-campic region, and an occipital or occipito-temporal region (Fig. 7).

The fronto-parietal region is formed by the internal aspect of

the superior frontal convolution (*gyrus frontalis superior*) already seen on the external surface. This convolution forms the border of the hemisphere for more than the anterior third of its entire length, and is separated from the limbic region by the calloso-marginal sulcus (*ramus marginalis* of the *sulcus cinguli*). Behind, it merges into the para-Rolandic lobule (*lobula paracentralis*), which, on the internal face of the hemisphere, represents the Rolandic convolutions. This lobule in turn is bounded above by the inter-hemispheric border, in continuation with that of the frontal region; below by the calloso-marginal sulcus (*sulcus cinguli*—Edinger), which separates it from the limbic region; and behind by the ascending branch of the calloso-marginal sulcus, called also the subparietal branch (*ramus subparietalis*).

For morphological and embryological reasons, the *limbo-hippo-*

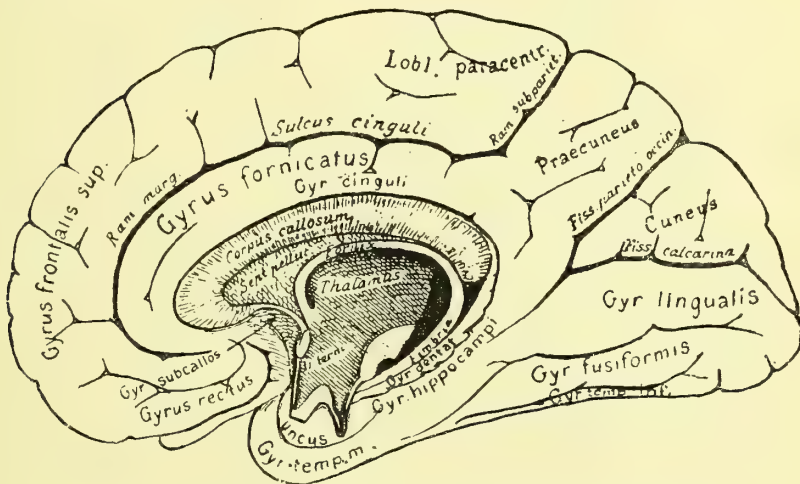


FIG. 7.—INTERNAL ASPECT OF THE CEREBRAL HEMISPHERE.

campic region is considered in its entirety, not divided into the three usual convolutions, the corpus callosum or gyrus fornicatus, the precuneus and the hippocampus. From the point of view of this work it is useful to consider this region as a whole. Commencing as the convolution of the corpus callosum (*gyrus fornicatus*, *gyrus cinguli*) underneath the *genu*, it follows very precisely the curve of the *genu*, being separated from it by the sulcus of the corpus callosum and from the frontal gyrus by the calloso-marginal sulcus (*sulcus cinguli*); after rounding the *genu* it is directed almost horizontally backwards, forming the central part of the gyrus fornicatus. At that point in its course corresponding exactly to the posterior part of the corpus callosum and its *splenium*, it widens out into the quadrate lobule or precuneus (*præcuneus*), this being well delimited in front by the ascending branch of the calloso-marginal sulcus (subparietal branch of the *sulcus cinguli*), behind by the occipito-

parietal fissure (*fissura parietalis occipitalis*), above by the inter-hemispheric margin, while below it is prolonged into the descending branch of the limbic convolution. The latter is continued without interruption into the convolution of the hippocampus (*gyrus hippocampi*). This convolution in turn forms the central region of the hemisphere, and results from the fusion of the part of the limbic convolution just described, and the lingual convolution or lobule belonging to the occipital lobe (*gyrus lingualis*; vide Fig. 7). It is prolonged almost horizontally in front, describing a slight curve with its convexity downwards, and after reaching the fissure of Sylvius recurves upwards and inwards, forming the *uncus* or *crotchet*, or, as some anatomists term it, the *uncinate convolution* (*uncus*).

OCCIPITAL REGION.—The precuneus or quadrate lobe, as already mentioned, is separated from the occipital lobe behind by the *occipito-parietal* fissure, usually very deep and prolonged downwards and forwards to meet the *calcarine fissure* (Fig. 7). The latter is in turn prolonged to the point where the descending branch of the quadrate lobule of the limbic convolution unites with the lingual lobule—which lies under the calcarine fissure—so as to form the convolution of the hippocampus.

As the calcarine fissure is almost horizontal in its posterior part, while the parieto-occipital fissure is oblique from above downwards and forwards, separating distinctly the limbic from the occipital lobe, the result is that a triangular portion of this internal occipital surface of the hemisphere, always easily recognisable, is enclosed between these two fissures. This portion, on account of its form, is termed the *cuneus*.

As shown in Fig. 7, what remains of the occipital lobe underneath the calcarine fissure is divisible into two convolutions—the superior, already indicated, is called the *lingual lobule* or *convolution* (*gyrus lingualis*), and extends forwards from the inter-hemispheric border in a slightly curved form, to meet the limbic convolution, becoming continuous with the hippocampus; the inferior, called the *occipito-temporal* convolution or fusiform lobule (*gyrus fusiformis*), runs in the same direction as the former, but is more straight and horizontal, and fuses in front with the convolutions of the temporal lobe. These last two convolutions are separated for a considerable distance by the occipito-temporal sulcus.

INFERIOR ASPECT OF THE CEREBRAL HEMISPHERE

The inferior aspect of the hemisphere may be roughly distinguished into two regions—the frontal or pre-Sylvian, and a more extensive one, the temporo-occipital or post-Sylvian—these being separated distinctly by the fissure of Sylvius. The first, as a whole, is the continuation on the inferior or orbital aspect of the hemisphere of the three frontal convolutions of the external aspect.

The innermost (called also the *straight* convolution) of the three convolutions thus formed is the continuation of the superior frontal convolution, and is indented by the furrow in which lies the olfactory lobule; the middle is a continuation of the middle frontal, and the outermost is part and parcel of the inferior frontal convolution. The three convolutions are practically separated by the olfactory sulcus (*sulcus olfactorius*) and the orbital sulcus (*sulcus orbitalis*).

The occipito-temporal portion is composed of three convolu-

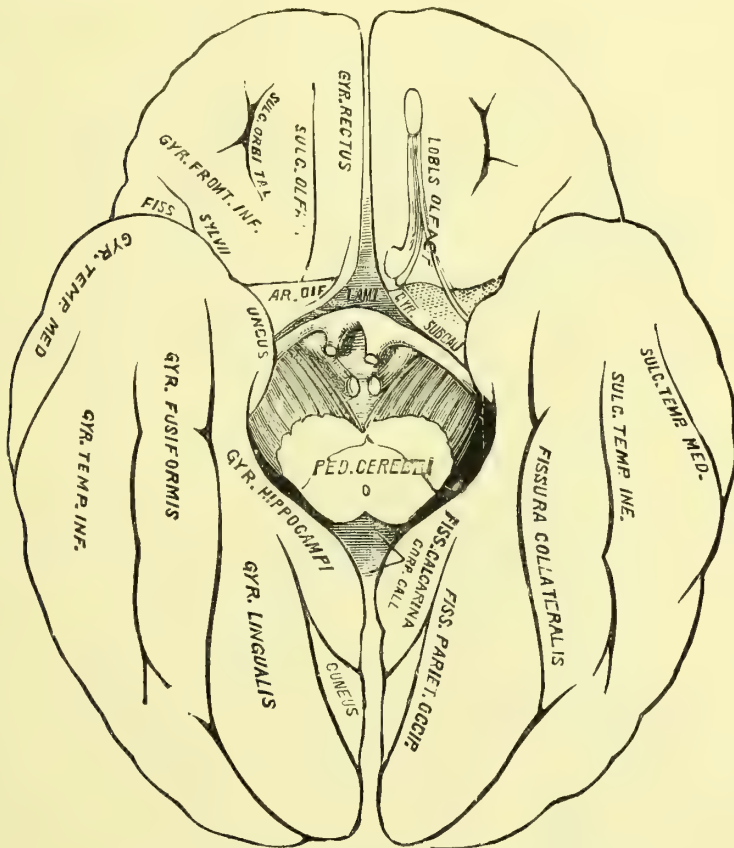


FIG. 8.—INFERIOR ASPECT OF THE HEMISPHERES.

tions—the outermost is the inferior face of the third temporal convolution, seen on the external aspect of the hemisphere (inferior or third temporal convolution, *gyrus temporalis inferior*); the middle goes by the name of the occipito-temporal convolution or fusiform lobule (*gyrus fusiformis*); whilst the innermost is the hippocampus (*gyrus hippocampi*).

Two sulci separate these convolutions from one another—the inferior temporal sulcus (*sulcus temporalis inferior*) and the occipito-temporal or collateral sulcus (*fissura collateralis*).

For our purposes it is useless to enter into fuller details, which

may be obtained by consulting numerous modern works on the anatomy of the brain. A few further details, however, will be discussed at a subsequent stage of the work, the aim of which, at this particular point, is to indicate merely the general features of the architecture of the brain, so as to render these clear and intelligible in such applications of them to physiology and psychology as we shall make in accordance with the practical nature and limits of this work. The anatomical provinces, as we have described them, do not, however, coincide with the physiological. On the contrary, the anatomy of the paths of projection and of association indicates a distribution of function quite different in its localizations to that of the convolutions and lobes on all aspects of the hemisphere. I consider it very useful in this connection to describe briefly such facts as the most recent anatomical researches have brought to light and established beyond all doubt. These we will compare with the results demonstrated by physiological researches and with the synthesis of clinical observation, with the ultimate object of showing how much at the present day is founded upon the distribution of the functions of the cerebral cortex. Let us begin by following the course of the central paths in the case of the olfactory nerves.

OLFACTORY PATHS AND CENTRES

The olfactory nervous apparatus commences with the protoplasmic processes of the bipolar cells situated among the epithelial cells of the olfactory mucous membrane. These bipolar cells with large nuclei constitute the first station of the olfactory wave, which is received by the external or peripheral process of a given cell and transmitted by the internal or axis-cylinder process (Fig. 9) (Schultze, Grassi and Castronuovo, Cajal). These centripetal processes collected together form the true olfactory nerve, and end in the olfactory bulb. The latter is a true cerebral lobe, and is, in fact, composed of several strata of nerve elements, the most important being :

The zone of the glomeruli, which are nothing else than the points of junction of the axis-cylinder processes of the bipolar cells of the nasal mucous membrane, with the protoplasmic processes of the mitral cells of the innermost stratum (fourth stratum of some authors).

The two processes (one from a bipolar cell, the other from a mitral cell), meeting together, form with their arborizations numerous twistings, from the sum of which the glomerulus results (I leave unprejudiced the question whether the said processes merely come into contact, or, in other words, terminate freely, as held by Van Gehuchten, Retzius, Kölliker, and the brothers Cajal, or whether they form a reticulum, as maintained by Golgi and the numerous researches of Apaty and others).

The olfactory wave, then, having traversed the protoplasmic process of the bipolar cell, the centripetal arborization of which enters into the formation of the glomerulus, is transmitted to the small nerve cells of the molecular layer and to the mitral cells—large triangular or mitre-shaped cells (fourth layer of some histologists). These cells in turn transmit it by means of their axis-cylinder processes, which go to form the white substance of the bulb, their collaterals distributing themselves in the zone of the granules and of the myelinated fibres composing the fifth layer of the olfactory

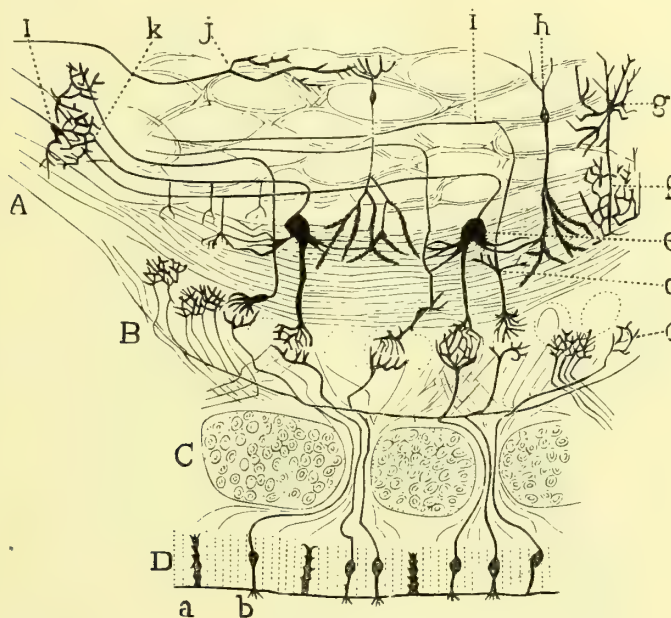


FIG. 9.—SCHEME OF THE OLFACTORY APPARATUS IN MAMMALS.

A, Olfactory lobe ; B, olfactory bulb ; C, cartilage of the lamina cribrosa in the embryo ; D, nasal mucosa ; a, supporting cell ; b, olfactory bipolar cell ; c, arborization of an olfactory fibre in the substance of the glomerulus ; d, small cell with basket work, and i, its axis cylinder process ; e, mitral cell ; h, granules ; g, large stellate cell, the short axis cylinder of which—f—terminates in the molecular layer ; j, arborization of fibres of central origin ; k, l, contacts between the arborizations of the central fibres and those of the axis-cylinder processes of the mitral cells.

bulb. From the axis-cylinder processes of the cells of the granular layer and of the mitral cells the olfactory wave passes along the fibres of the olfactory tract and reaches the brain.

Fig. 10 indicates even more clearly the course of the olfactory wave.

The olfactory tract, lying with its upper border in the olfactory sulcus formed internally by the straight convolution of the frontal lobe, and externally by the orbital part of the first frontal convolution, extends from before backwards to near the anterior perforated spot. It forms the so-called olfactory tubercle or trigone, and

divides into two branches or roots (according to others into three), an external and an internal (*vide* Fig. 8). In some cases a very delicate middle branch can be distinctly made out, but not infrequently it is absent.

The external branch can be traced as far as the uncinate convolution, giving off fibres, according to some authorities, to the nucleus of the amygdala, and other branches to the inner part of the temporal lobe and the hippocampus.

The other branch, called also the internal white root, buries itself in the perforated substance, and is directed inwards and upwards. The further source of the fibres in this root is still obscure. Obersteiner believes that they run to the sides of the corpus striatum, and assume relations also with a number of large fusiform ganglionic cells which he refers to the central olfactory apparatus.

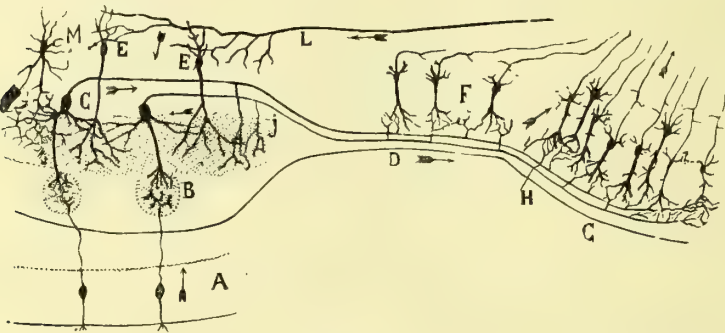


FIG. 10.

A, Olfactory mucosa ; B, olfactory glomerulus of the bulb ; C, mitral cells ; E, granules ; D, olfactory tract ; G, region of the external white root of the olfactory nerve ; F, pyramidal cells of the tract ; M, cells with short axis cylinder ; j, collaterals of the axis cylinders of the mitral cells at the level of the olfactory bulb ; H, collaterals of these same axis cylinders in the tracts ; L, centrifugal fibres. (From R. Cajal.)

Another bundle from this same root, turning upwards and inwards, would seem to diffuse itself partly in the anterior section of the gyrus fornicatus, and partly (according to others) in the posterior section. According to Dejerine, this root loses itself in the *olfactory carrefour* of Broca, formed by the first frontal, where it fuses with the limbic convolution (Fig. 7). Before the olfactory tract divides into the branches or roots above indicated, it supplies twigs to the gray substance of the olfactory sulcus in which it is embedded (part of these fibres form the superior olfactory root of Broca). I have been able to follow some of those fibres in vertical sections of the brains of monkeys almost up to the anterior peduncle of the trigone (Weigert's coloration).

Another bundle, little developed in man and monkeys, but very marked in keen-scented animals, would seem to be directed towards the anterior commissure. From this bundle fibres going to the

anterior part of the optic thalamus are given off. This olfactory part of the anterior commissure contains both commissural fibres uniting the two olfactory lobes, and others which, after crossing the median line, unite the olfactory lobe of one side with the temporal lobe of the opposite.

In order to complete the summary of the olfactory system, it will be sufficient to describe the diagonal tracts of Broca which detach themselves from each side of the beak of the corpus callosum, in front of which they diverge, proceeding obliquely outwards and backwards. In this way they cross diagonally the anterior perforated space, directing themselves towards the adjacent border of the temporo-sphenoidal lobe. These fibres are formed partly by

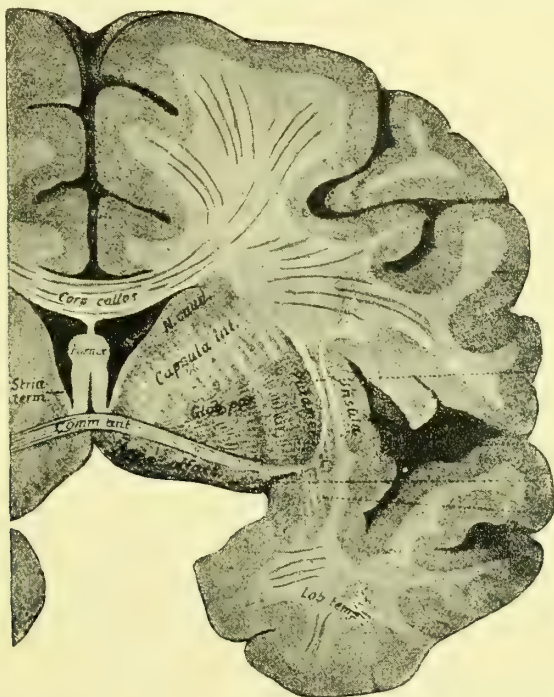


FIG. 11.—VERTICAL SECTION OF THE BRAIN AT THE LEVEL OF THE ANTERIOR COMMISSURE.

the nerves of Lancisi, which, classed among the rudimentary convolutions, should be considered as the continuation of the fascia dentata.

The olfactory radiations pass through a layer of white fibres, found between the layer of gray matter covering the anterior perforated spot and the *globus pallidus* (second and third segment of the lenticular nucleus). This explains how it is that extensive lesions of the posterior part of the internal capsule can produce alterations of the sense of smell. The anterior commissure also is formed in man by a stout bundle of nerve fibres passing through the posterior part of the internal capsule, and serving for the most part to establish an ample association between the temporal lobes, and especially

between the hippocampi on either side, and perhaps also between the occipital lobes and between the nuclei-amygdalarum (Fig. 11); it is accordingly supplementary to the corpus callosum.

The true origin of its fibres, however, is still unknown. One case recorded by Popof and another by Flechsig pointed to the belief that it constituted a commissure between the two lingual lobes and the fusiform convolutions. The cases of Henschen and the observations of Dejerine contradict this theory. Further and more accurate observations are requisite for the solution of this anatomical problem.

There is, however, an olfactory part of the anterior commissure, very scant in man, but pronounced in keen-scented animals, composed of fibres passing—at least, in part—from the cortex of the olfactory lobe to the homonymous cortex of the other side. If this is the case, one cannot compare the anterior commissure to the optic chiasma, because it is not the fibres of the olfactory nerves that cross in the anterior commissure.

Meynert's hypothesis of a decussation of the olfactory tracts in the anterior commissure is contradicted by the observations of Gudden and Ganser. In conclusion, we may consider it demonstrated that the anterior commissure contains a so-called olfactory part (improperly called olfactory chiasma), with fibres which cross and put the two olfactory bulbs in interrelation, and fibres crossing in the median line to unite the olfactory lobe of one side with the temporal lobe of the other (Dejerine). There is, moreover, the commissural part of which we have already spoken.

In some mammals there is an ascending branch of the anterior commissure, which passes into the external capsule and unites the dorsal parts of the limbic lobes of both sides (Edinger).

Experiments on the olfactory cortical centres have also yielded somewhat uncertain results, and show that these are situated on the hemisphere of the same side. While some clinical cases, such as those of Ogle, Flechner, and Ransome, demonstrate that anosmia is found in the nostril opposite to the paralyzed side—*i.e.*, homonymous with the injured hemisphere—other cases in which hemianosmia is found on the same side as the paralysis—*i.e.*, on the side opposite to the injured hemisphere—can probably be interpreted as resulting from defect of tactile sensation on the paralyzed side, it being well known that the anæsthesia following a lesion of the trigeminus produces disturbances of smell (Magendie and others).

So far, it is clear that the fibres which pass by means of the anterior commissure from the olfactory bulb of one side to the temporal lobe of the other could explain the hemianosmia, possibly temporary, observed in some cases, on the side opposite to the lesion, when the previous interpretation affords no solution, because it is well known that the number of these fibres, as also the formation of the nerves of Lancisi and the diagonal tract, vary very much in different individuals.

Fig. 12, taken from Obersteiner's work, shows quite clearly the distribution of the fibres of the olfactory tract in accordance with the present state of our knowledge. It assists also in removing the contradictions of individual observers.

If Ferrier maintains that the centre of smell is the uncinate gyrus, and Schäfer, on the contrary, holds with equal reason that a marked disturbance of smell is produced by destruction of the anterior part of the limbic lobe, and others, again, by destruction of the posterior part—a fact which has been fully confirmed by the experiments of Dr. Sacconi carried out in my institute—this is due to the fact that the whole limbic lobe and the corpus dentatum must be considered as the cortical centre, not merely the *olfactory carrefour* and the anterior perforated substance. It appears that we must also retain the trigone and the septum lucidum as olfactory paths. Whether the bundle of Vicq D'Azir, going from the mammillary

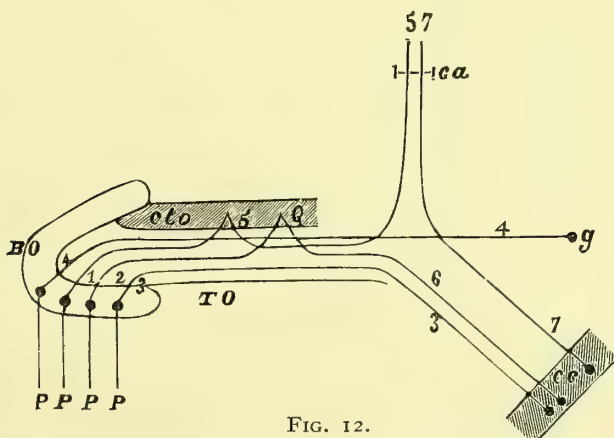


FIG. 12.

BO, Olfactory bulb; TO, olfactory tract; P, membrane of Schneider; cto, cortex of the olfactory tract; cc, cerebral cortex; g, central ganglion; ca, anterior commissure; 5, olfactory part, and 7, hemispheric part of the anterior commissure. (Obersteiner.)

body to the anterior nucleus of the optic thalamus, is also an olfactory path, inasmuch as the mammillary body receives the anterior peduncle of the trigone, is a point which only further researches will either confirm or disprove.

This much is certain, that in the formation of the olfactory system (rhinencephalon) there also take part the dentate convolution and its prolongations on the surface of the corpus callosum in the form of the nerves of Lancisi, and that the cornu ammonis, the gyrus fornicatus, and the corpus dentatum, all highly developed in keen-scented animals, ought to be considered as cortical organs connected with the function of smell. In recent times Retzius has regarded the anterior perforated substance (*gyrus perforatus rhinencephali*) and the gray substance surrounding the olfactory tubercle as also forming part of the rhinencephalon.

OPTIC PATHS AND CENTRES

The luminous waves are received by the retinal rods and cones, which should be considered as the modified free extremities of the protoplasmic processes of the nerve-cell corpuscles of the retina. The different forms of the rods and cones, and the difference between the cell elements from which they originate should lead to the conclusion that they must receive different luminous waves ; according to some, the rods would serve for the reception of uncoloured light, the cones for coloured light. Both rods and cones are in relation with cell bodies of different form and situated at different distances

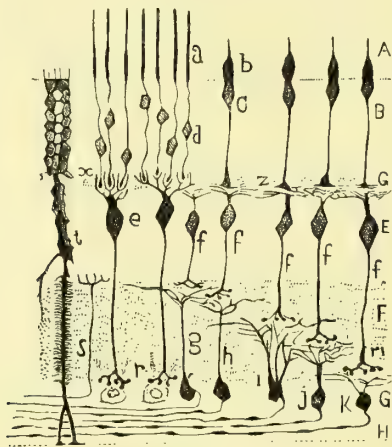


FIG. 13.

A, Layer of the rods and cones ; B, bodies of the visual cells (external granules) ; C, external plexiform layer ; E, layer of the bipolar cells (internal granules) ; F, internal plexiform layer ; G, layer of the ganglion cells ; H, layer of the fibres of the optic nerve ; a, rod ; b, cone ; c, cell-body of the cone ; d, cell-body of the rod ; e, bipolar cell for the rod ; ffff, bipolar cells for the cones ; ghijk, ganglion cells ramifying at various levels of the internal plexiform layer ; r, inferior arborization of the bipolar cells for the cones ; t, cell of Mueller, or epithelial cell ; x, contacts between the rods and the bipolar cells ; z, contact between the cones and the bipolar cells ; s, centrifugal nerve fibres.

—those of the cones in proximity to the cones, those of the rods at a greater distance (Fig. 13). Where the axis-cylinder processes of the cells of the rods and cones meet with the expansions of the protoplasmic processes of the underlying layer of cells, there occurs an interlacement of arborizations, to which has been assigned the name of external plexiform layer. These protoplasmic expansions found here belong to the succeeding layer, which is composed of bipolar and other cell forms (horizontal, stellate), constituting a second order of retinal cell corpuscles—the internal granular layer.

These latter cells transmit the waves by their axis-cylinder prolongations to a third order—the so-called ganglionic cells. Between these two layers of cells, however, there is another layer formed by the

axis-cylinder prolongations, from the internal granular layer meeting and interlacing with the protoplasmic processes of the various cell forms situated more externally—the internal plexiform layer.

It is the axis-cylinder processes of the ganglionic cells that form the fibres of the optic nerve.

This diagrammatic description of the nerve elements of the retina helps us to understand the course of the luminous waves, and it is well to bear in mind that various forms of cell corpuscles are found in the different retinal layers. Among these, I must not neglect to mention the so-called spongioblasts, found more or less at all levels of the *internal granular layer*, but in greatest number in the deepest zone. These cells present the peculiarity of not possessing axis-cylinder processes, but only a rich expansion of protoplasmic processes which come into contact with axis-cylinder processes and collaterals belonging to other types of retinal nerve cells (the bipolar,

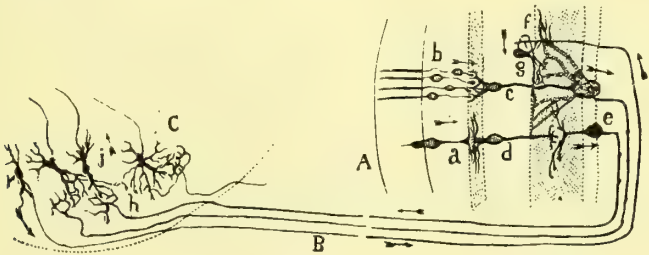


FIG. 14.

A, Retina ; B, optic nerve ; a, cone ; b, rod ; d, bipolar cell for the cone ; c, bipolar cell for the rod ; e, ganglion cell ; f, centrifugal nerve fibre ; g, spongioblast ; h, free arborization of fibres coming from the retina ; j, nerve cell, the protoplasmic expansion of which serves to receive the excitation transmitted by the optic fibres ; r, cell from which the centrifugal fibre probably arises. (From R. y Cajal.)

the ganglionic), and also with the centrifugal fibres which are supposed to be concerned in the conduction of nerve waves from the centres to the ganglionic cells (centrifugal optic paths). Such cell elements have the credit of establishing associative relations between nerve elements of varying form and physiological significance. Besides the spongioblasts, however, there also exist collaterals of the nerve prolongations, as well as protoplasmic collaterals, thus making the function of the retina much more complicated than would appear from this schematic description. The accompanying diagram renders much more intelligible the most probable course of the luminous rays (Fig. 14).

The optic nerves, according to some, are formed from those short fibres running between the rods and cones and the respective nerve cells found in the retina. When, however, one considers the relatively small proportion of retinal nerve cells, in comparison with the number of fibres in the optic nerve, this presumption can only in part be justified.

The optic nerves, as all anatomists regard them, may be considered as composed of two bundles, of which one—the external—passes into the optic tract of the same side, and the other—internal—decussates with the internal bundle of the optic nerve of the other side, to form the chiasma. This is composed of different orders of fibres :

1. Uncrossed fibres situated at the outer border of the chiasma : these come from the outer half of the retina and pass to the tract on the same side.

2. Fibres coming from the inner half of the retina : these decussate, in the chiasma, with the corresponding fibres of the other side and pass to the optic tract on the opposite side.

3. Fibres going from one optic tract to the other, passing through the posterior angle of the chiasma. This is the inferior commissure of Gudden, which, strictly speaking, should not form a part of the optic nerves.

4. By some there is described an anterior commissure of the chiasma, formed of fibres establishing relations between the two retinæ.

5. The commissure of Meynert, composed of fibres originating from the large pigmented cells found in the *tuber cinereum*. At that part of the anterior perforated substance overlying the optic tract these fibres decussate at an acute angle, right above the chiasma, and pass into the tract. They appear to terminate in the subthalamic substance.

The optic tract, before reaching the optic thalamus, to which it is directed, divides into two branches or roots—one external and the other internal.

The external root appears to merge as a whole into the external geniculate body, but in reality gives off three important bundles of fibres ; one goes to form a part of the external geniculate body, another reaches the pulvinar, and the third arrives at the anterior quadrigeminate body, passing through the peduncle of the latter.

Some other fibres of this root go to constitute the stratum zonale of the optic thalamus. The three ganglionic masses above indicated are, as it were, three intermediate stations on the external branch of the optic tract ; from them issue paths (optic fibres) which reach the post and subthalamic parts of the capsule, and proceed to form the sensory bundle situated at the outside of the posterior horn of the lateral ventricle and the *tapetum*, and forming the principal optic path to the cortex of the occipital lobe. (Wernicke, Brissaud, Dejerine, Vialet, Henschen, and others.)

The internal root can be followed as far as the internal geniculate nucleus.

Obersteiner holds that many fibres of the internal root penetrate the internal geniculate ganglion, while some would seem to pass to the anterior and others to the posterior corpus quadrigeminus.

The researches of Monakow and Colucci, however, have demonstrated that no atrophy is found in the internal geniculate ganglion consequent upon enucleation of the eyes, while it is observed in the external geniculate body. Monakow furnishes clear evidence that the fibres of the internal geniculate body and of the posterior quadrigeminate body are in connection with the temporal lobe, and that accordingly the posterior quadrigeminate and the internal geniculate bodies ought to be regarded as intermediate acoustic paths and stations.

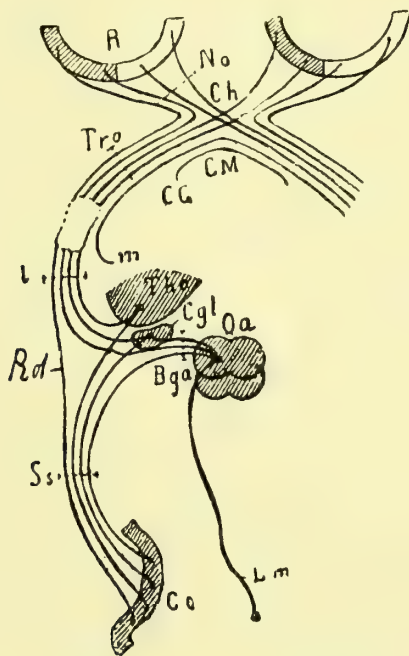


FIG. 15.—SCHEME OF THE COURSE OF THE OPTIC PATHS FROM THE RETINA TO THE CORTEX.

R, Retina, the external half of which corresponds to the hemisphere of the same side, the internal half being related to the opposite hemisphere; No, optic nerve; Ch, chiasma; Tro, optic tract, or bandelette; CM, commissure of Meynert; CG, commissure of Gudden; l, lateral root; m, median root of the tract; Tho, optic thalamus; Cgl, lateral geniculate body; Qa, corpora quadrigemina; Bga, brachium of the anterior quadrigeminate body; Rd, direct cortical root of the tract; Ss, subcortical optic radiations; Co, visual cortex; Lm, lemniscus.

It is not improbable, then, that the internal root is constituted in part by the fibres of the inferior commissure of Gudden and that of Meynert.

In all probability the majority of the fibres of the internal root pass into the optic thalamus.

Besides the given paths of the tract, there are still others. Among these we must mention (a) the superficial or middle root (Stilling), which, passing between the geniculate bodies, proceeds

directly to the anterior quadrigeminate eminence; (*b*) the deep root of the tract, composed of fibres which reach the cerebral peduncle, accumulate on the outer part of the *pes*, and project themselves, as direct radiations, into the white substance of the hemisphere, where they pursue a course along with the longitudinal medullary bundle of Wernicke, towards the occipital lobe. This root is the so-called *direct hemispheric bundle* of Gudden. Some of these fibres descend in the cerebral peduncle, and seem to have been followed by Stilling to the level of the decussation of the pyramids (Obersteiner). (*c*) Fibres going directly from the chiasma to the gray substance of the third ventricle (basal root of the optic nerve). (*d*) According to Darkschewitsch, the oculo-motor nerve would also seem to get from the optic tract a small bundle, which, after leaving the external geniculate body, would appear to proceed through the optic thalamus to the pineal gland and the *pedunculus conarii*, and from this latter to the oculo-motor nerve, by means of the ventral part of the posterior commissure.

From the three principal ganglionic masses of the optic tract—the external geniculate body, the optic thalamus, and the anterior quadrigeminate body—there issue ganglio-cortical fibres constituting the so-called optic radiations going to the cerebral cortex.

They form what Vialet calls the bundle of the visual fibres, or layer of the optic radiations, which, by describing a course closely following the tapetum, makes a circuit of the ventricle by a somewhat spiral course along the external side, diminishing in volume in proportion as it approaches the cortex, where it expands on the internal aspect of the occipital lobe and pole. Along this course the cortical optic fibres mingle with the fibres of projection of the temporal and parietal lobes and other associated bundles, with which they decussate at a more or less acute angle. Fig. 15, taken from Obersteiner, shows some of the most assured relations mentioned above. It is well to add, however, that many do not admit the existence of the direct cortical root of the tract.

At this point we may be permitted to make a slight digression, in order to clear the way for what we have to say subsequently.

Brissaud does not agree with Vialet in the distribution of the optic radiations and the signification of the inferior longitudinal bundle. He distinguishes three layers of fibres in the large antero-posterior white mass of the occipital lobe: (1) The tapetum, (2) the internal sensory bundle, (3) the external sensory bundle.

Vialet admits that only the second of the above-mentioned bundles comprises the optic radiations, and that the third—*i.e.*, the external sensory bundle—may constitute a system of association with a long endo-hemispheric course, and may therefore represent the inferior longitudinal bundle; while Brissaud holds that the external bundle contributes to the formation, but is not the sole constituent, of the inferior longitudinal bundle. In fact, it contains

many fibres of radiations coming from the corona radiata of the optic thalamus and from the second and third segment of the lenticular nucleus. It would thus be largely a projection bundle. In a later work of Vialet the statements of Brissaud are, in the main, accepted ; for he concludes that the inferior longitudinal bundle (or external sensory bundle) is composed of various fibres, the majority of them terminating in the temporal lobe (associative fibres), while some go to join with the fibres of the corona radiata of the optic thalamus, and others to the external capsule and the second and third segments of the lenticular nucleus.

We come now to the question of the whereabouts of the cortical visual area.

In recent years the knowledge derived from a closer observation of clinical facts has quite revolutionized the original doctrines of Ferrier, Munk, and many others who had looked on the angular gyrus, or the occipital lobe, or both together, as the visual area. Collections of accurate observations have demonstrated the fact that we cannot consider the whole external face of the occipital lobe as a cortical optic centre, much less the angular gyrus, but only the internal face of the occipital lobe, and particularly of the occipital pole. These observations have given rise to strong suspicion that all the experimental lesions (besides those wrought by disease in man) producing hemianopsia and, on which had been reared the occipito-external doctrine of the visual area, had caused hemianopsia only to a degree corresponding to the extent of the injury to the external and internal sensory bundles. In this inquiry there figure conspicuously the observations and researches of Henschen, Vialet, Dejerine, Brissaud, Wilbrand, etc., but they do not agree with one another.

Henschen holds that the optic centre is limited to the cortex of the calcarine fissure, on which would occur the cortical projection of the fibres of the retina, with this specialization: that the central part of the optic centres, corresponding to the *macula lutea*, is found in the anterior part of the calcarine fissure ; the inferior lip of the calcarine fissure would correspond to the upper, the superior lip to the lower, visual field ; each half of the *macula* would be represented in a different hemisphere. If these views were really supplemented by either experimental research or clinical observation, that part of the cortex of the occipital lobe defined by Henschen would be a true projection of the retina upon the cerebral cortex. Henschen expresses a strong doubt whether the occipital point participates in the formation of the optic centre, and denies that the visual function may be situated also in the cuneus.

This hypothesis of Henschen revives the general features of Munk's doctrine, except that while the latter refers the visual area to the external face of the occipital lobe of the dog, Henschen has transferred its field to the cortex of the calcarine fissure. Vialet is

opposed to the restricted localization held by Henschen, and, on the ground of several clinical cases, and the study of various anatomical data, has arrived at the conclusion, certainly more worthy of consideration, that the cortical visual field is much more extensive than Henschen would lead us to believe ; that, although unable to

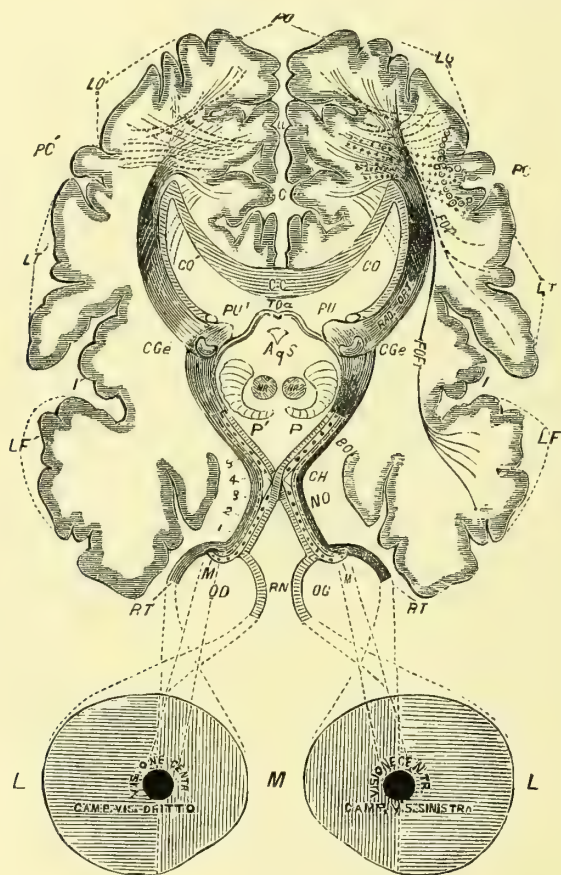


FIG. 16.—VIALET'S SCHEME.

AqS, Aqueduct of Sylvius ; BO, optic tract ; C, cuneus ; CC, corpus callosum ; CO, occipital cornu ; CGe, external geniculate body ; CGi, internal geniculate body ; CH, chiasma ; FOF, occipito-frontal bundle ; FOT, occipito-temporal bundle ; I, insula ; LF, frontal lobe ; LL, lingual lobe ; L, limbic lobe ; LO, occipital lobe ; LT, temporal lobe ; PC, parietal convolution ; NO, optic nerve ; NR, red nucleus ; NC, caudate nucleus ; OD, right eye ; OG, left eye ; RAD. OPT., optic radiations ; RN, nasal portion of the retina ; RT, temporal portion of the retina ; Pu, pulvinar ; P, peduncle ; TQa, anterior quadrigeminate tubercle.

fix its limits, it lies on the internal aspect of the occipital lobe, represented not only by the calcarine fissure with its superior and inferior lips, but also by the cuneus and the cortex of the lingual lobe. This proposition would be strengthened by the existence of fibres of projection, denied by Brissaud, but admitted by Vialet. I also am inclined to hold that the cuneus forms part of the visual area, and

that, moreover, it forms part of the area of greater functional intensity, drawing this conclusion from the intense degree of atrophy of the cuneus which I found in a case of long-standing blindness in an old servant who died in the clinique of Sales.

That the question, then, of retinal projection propounded by Munk and supported by Henschen does not solve the other of the visual centres considered as registers of the concrete images is demonstrated by the very nature of vision and the various factors whence it results. We shall discuss this subject at some length in the chapter following. After the perusal thereof it will become easy for us to understand how, even if we could accept the hypothesis of a projection of the retina upon the cerebral cortex, we would not on this account be warranted in assigning to this centre the signification of a visual centre, but only that of an optic centre, which is a totally different thing.

The visual centre, considered as a register of images, should be looked upon as much more extensive—a matter which, from a clinical and psychological point of view, is of great importance. The most recent clinical observations of Mey, Cacqueur, and Barba (of the clinique of Professor Rummo), as well as my own experiments, the later ones of Gagnani, and the observations of Colucci, lend themselves to the confirmation of the idea that the optic area is not to be confined to the calcarine fissure, but is much more extensive, as I have said above. Viale's scheme (Fig. 16) helps us to understand all the facts now elucidated.

ACOUSTIC PATHS AND CENTRES

In the organ of Corti in the cochlea, as well as in the epithelium of the auditory crest of the semi-circular canal, the nerve elements terminate with free intercellular ramifications, like those of the olfactory nerve (Retzius, R. y Cajal). These free arborizations belong to the polar cells, which are situated at a distance from the epithelium, thus differing from what we find in the case of the olfactory mucous membrane (R. y Cajal). The axis-cylinder processes of the bipolar cells go to form the acoustic or cochlear nerve.

I shall now mention here only a few points which are of use in furnishing a fairly precise knowledge of the course of the acoustic paths from the nuclei to the cortex; these paths have been defined especially by the researches of Flechsig, Onufrowicz, Bechterew, Baginsky, and Spitzka. Of the nuclei of the eighth nerve, the anterior should be regarded as the true nucleus of the acoustic nerve, being related with the trapezoid body on the one hand and the cochlear nerve on the other; the latter should be considered as the true acoustic nerve, while the vestibular nerve—which, by the way, gets a medullary sheath before the cochlear nerve—should be regarded as designed for some other function.

Beginning, then, at the cochlear nerve which goes to the anterior nucleus of the acoustic nerve, the acoustic paths are formed in great measure by the trapezoid body (Fig. 17), whence a portion of the fibres passes, according to Flechsig, to the lateral lemniscus, which also receives many fibres from the superior olive, and enters the posterior quadrigeminate body.

According to Onufrowicz, the true auditory nerve would be

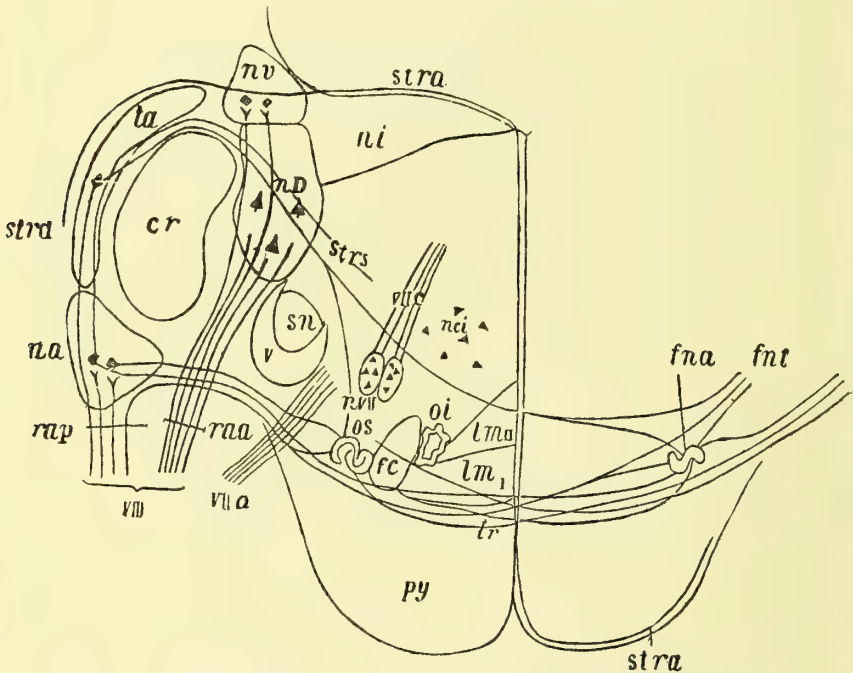


FIG. 17.

VIII, Acoustic nerve; rap, raa, posterior and anterior roots of the acoustic nerve; na, anterior nucleus of the acoustic nerve; ta, acoustic tubercle; strd, medullary or acoustic striæ; strs, medullary striæ of Monakow; cr, restiform body; nv, vestibular nucleus; ni, so-called middle acoustic nucleus; nD, Deiter's nucleus; VIIa, ascending root (?) of the facial; VIIc, descending root of the facial; nVII, nucleus of the facial; Oi, superior extremity of the large olive; fc, central path to the calotte; Os, superior olive; tr, trapezoid body; Py, pyramid; nci, inferior central nucleus; fna, bundles from the superior olive to the nucleus of the abducens; fnt, bundle of the lateral fillet of Reil; V, ascending root of the trigeminus; sn, substantia gelatinosa; lm₁, lm₁₁, portions of the fillet of Reil.

formed by the posterior root (acoustic), and would take origin from the auditory tubercle—a gray mass described by some authorities as a part of the flocculus. This same posterior root, according to the last-mentioned author, would pass through the anterior acoustic nucleus without stopping, finally terminating in the acoustic tubercle.

In our opinion, the researches of Bechterew and Flechsig should be considered of greater value from the fact that the acoustic

tubercle in man is little developed, while the anterior acoustic nucleus is rather well developed; and, on the other hand, if, as Onufrowicz holds, the trapezoid body is not found wholly degenerated after destruction of the internal ear in animals, it is because, in his opinion, the trapezoid body is not composed of acoustic fibres alone, but, as Flechsig demonstrated, contains fibres of various natures, among which are commissural fibres passing between the

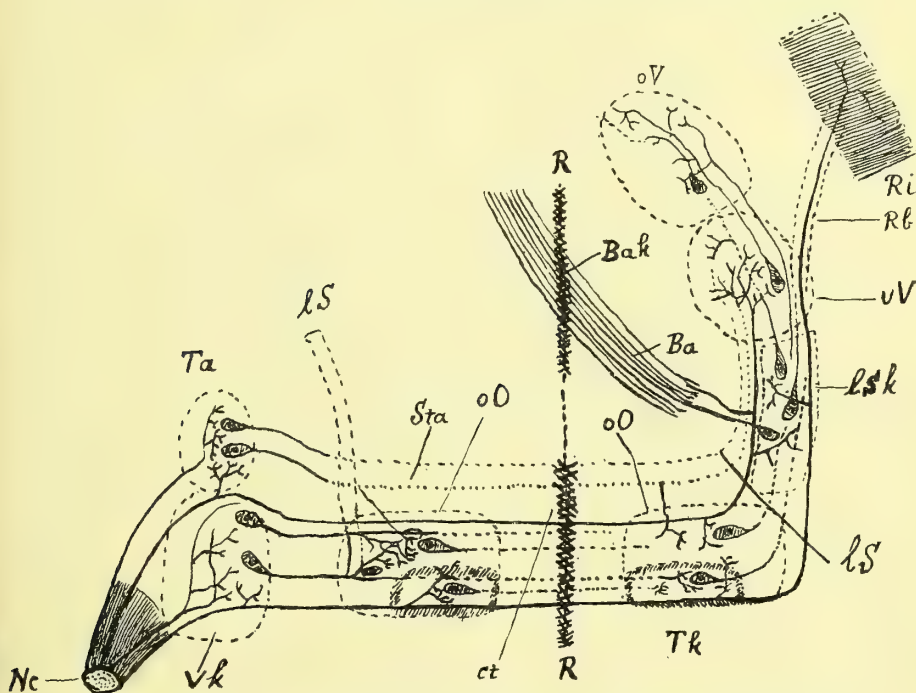


FIG. 18.—SYSTEM OF THE CENTRAL COURSE OF THE AUDITORY FIBRES (SYSTEM OF THE SECOND ORDER).

Nc, Cochlear nerve; vk, anterior nucleus; ct, trapezoid body; Tk, nucleus of the trapezoid body; oO, superior olive; Ta, acoustic tubercle; Sta, striae acousticae; lS, lateral lemniscus; lSk, nucleus of the lateral lemniscus; Ba, brachia, and Bak, decussation of the brachia of the corpora quadrigemina; oV, anterior corpus quadrigeminus; uV, posterior corpus quadrigeminus; Ri, cerebral cortex; Rb, cortical paths; R, raphe. (From Bechterew.)

two anterior acoustic nuclei, like the fibres of the posterior commissure of Gudden between the primary optic centres.

This same fact is proved in the research work of Baginsky, who has shown by the method of ascending degeneration that the acoustic apparatus would in reality be constituted by the anterior nuclei of the acoustic nerve. He seems likewise to have discovered definite relations between it, the trapezoid body, and the superior olives. Besides this, he apparently confirms the relations established by Monakow, by the method of descending degeneration. Monakow, in fact, has found atrophy in the internal geniculate body

and posterior quadrigeminate body as the result of destruction of the cortical auditory centre. If proof is still wanting that the acoustic paths are represented by the trapezoid body, the posterior quadrigeminate body, and the internal geniculate body, we might call into requisition the result of the interesting research of Spitzka, who has found in the crustaceans, which have a highly developed auditory organ, a correspondingly great development of the trapezoid body, besides the posterior quadrigeminate and internal geniculate bodies. According to him, the fibres of the acoustic nerve would pass into the trapezoid body of the same side, whence, after decussating, they would proceed through the lateral lemniscus to the posterior quadrigeminate and internal geniculate bodies of the opposite side. The lateral lemniscus, then, contains auditory fibres establishing relations between the superior olive—which may be considered as an acoustic station—and the posterior quadrigeminate body by means of fibres from the trapezoid body and the acoustic striæ of the opposite side. The acoustic fibres coming from the internal geniculate body and the optic thalamus would pass through the sublenticular part of the internal capsule, and, according to Brissaud, Flechsig, Vialet, and others, would pass through the external sensory bundle into the corona radiata in the temporo-sphenoidal lobe, and thence to the cortex of the first and second temporo-sphenoidal convolutions (*vide* Scheme, Fig. 18). The cortical auditory centre would be constituted, then, by these two convolutions, more especially by the middle and posterior parts of them.

THE PATHS AND CENTRES OF COMMON SENSIBILITY

The tactile, thermic, painful, etc., waves are received by special nerve organs placed in the skin, and are transmitted through centripetal fibres to the unipolar cells of the intervertebral ganglia, whose processes emerge to form the fibres of the posterior roots (His, Kölliker, Cajal). These, after reaching the spinal cord, divide into two branches—an ascending and a descending—terminating in the posterior columns and in the substance of Rolando.

The outermost fibres of the posterior root penetrate the cord, run vertically upwards for a distance, and are then deflected into the gelatinous substance of Rolando. The middle fibres penetrate directly the gray substance of the posterior cornu, where they come into relations, by means of their arborizations, with the cells of the said cornu. The innermost run obliquely upwards in the cuneiform column, describing a curve with its convexity inwards, and have various destinations; some, the most internal, constitute the zone of entrance of the posterior roots (Westphal), and form by preference the centripetal path of deep sensibility and of the tendon reflexes; others are directed towards the column of Clarke, where they come

in contact with the arborizations of the cells of that column, from which there issue processes going to the direct cerebellar tract ; others, finally, run for a certain distance upwards and inwards, and pass into the column of Goll (gracilis), being continually pushed further inwards by the analogous fibres of the other roots, which successively enter the spinal cord from below upwards. In this manner the long fibres of the sacral, lumbar, and dorsal roots pass in the cervical region through the column of Goll, which at that level, according to Dejerine and Sottas, does not contain either endogenous

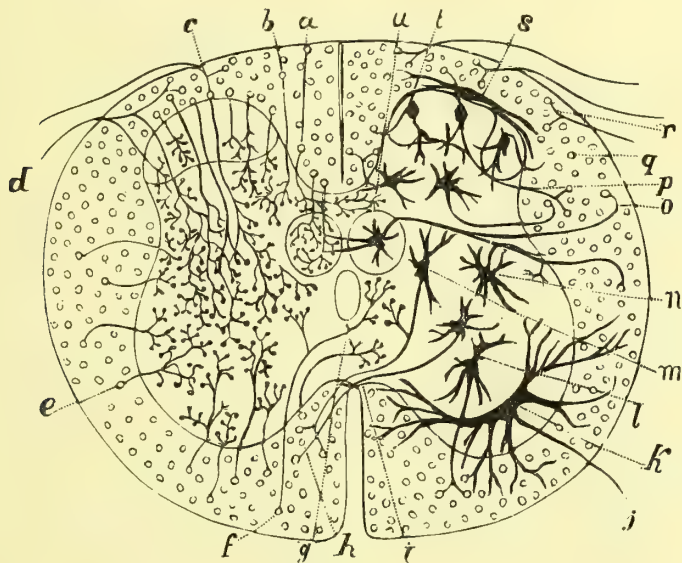


FIG. 19.

a, Collaterals of the column of Goll forming the posterior commissure ; b, collaterals of the column of Goll going direct to the posterior cornu ; c, collaterals of the posterior column going direct to the central gray substance and also to the posterior cornu ; d, root fibre and its collaterals ; e, collateral fibres of the anterior column ; f, collaterals going direct to the anterior commissure ; g, their tract in the commissure ; h, fibre of a commissural cell, k, passing through the commissure to the anterior column ; i, tract of this fibre in the commissure ; j, axis cylinder going directly from a large cell, k, to the anterior root ; l, cell of the anterior cornu with bifurcated axis cylinder ; m, cell with commissural axis cylinder ; n, associative cell ; o, axis cylinder of a cell of the column of Clarke ; p, fibre coming from s, a marginal cell of the substance of Rolando ; q, transverse section of an axis cylinder ; r, bifurcation of the posterior root fibres into an ascending and a descending branch ; u, cell body of the column of Clarke.

fibres or descending root fibres. Many of the fibres forming the columna gracilis, however, are only collaterals (discovered by Golgi, and confirmed by Kölliker, Van Gehuchten, Retzius, Ramon y Cajal, etc.) of the medullated fibres of the posterior root. They arise at right angles from the nerve processes, and end in free terminal arborizations. Some are root fibres coming directly from the other side, as affirmed by Löwenthal, but denied by others who have confined their experimental lesions to the posterior roots (Mott, Dejerine,

Spiller, and Russell). I mention here the most important of these collaterals, according to Cajal, and they are represented along with the others in Fig. 19.

COLLATERALS OF THE LATERAL COLUMN.—These ramify within the central region of the gray substance. One part of them reaches the posterior commissure, and terminates in the posterior cornu and the central gray substance of the opposite side.

COLLATERALS OF THE POSTERIOR COLUMN.—Some of these become detached either from the fibres of the posterior root before its division into ascending and descending branches, or from the ascending branch of it, and terminate in the anterior cornu; they are the reflexo-motor fibres of Kölliker. Some, again, go to form branches of an arborization shut up in the head of the posterior cornu, whilst others, detached from the fibres of the columns of Goll, terminate with arborizations in the column of Clarke. Finally, others from the column of Goll cross the posterior part of the posterior commissure, and terminate in the head of the posterior cornu (Fig. 20).

Ludwig had attempted experiments to demonstrate that a considerable number of the sensory fibres pass in the lateral columns; not only is this hypothesis supported by Schiff and Landois, but two eminent English physicians would appear to have brought forward clinical proof of this doctrine. Gowers observed in an individual who had sustained crushing of the spinal cord, not only degeneration of the columns of Goll above the lesion, but also tracts of ascending degeneration in a zone situated in front of the pyramidal bundle, and behind the lateral process of the anterior cornu. Byrom Bramwell, in a case of severe transverse myelitis, found, besides degeneration of the ascending fibres in the columns of Goll, a degenerate bundle in front of the pyramidal bundle and behind the anterior cornu. Hadden and Sherrington have published an accurate study of these fibres, and from the entire collection of researches published up till now it is quite certain that in front of, and partly within, the direct cerebellar tract and the pyramidal tract there exists another with its base from without inwards, going deeply into the mixed fundamental zone of the antero-lateral column, and extending in front as a marginal zone of the said column as far as the zone of entrance of the anterior roots. It has recently been demonstrated that the fibres of this tract do not directly belong to the posterior root, because they do not degenerate as the result of section of the posterior roots. In consequence of a profound lesion and crushing of the spinal medulla, however, the given tract is found more degenerate on the side opposite to that in which the degeneration of the columns of Goll is more marked—that is to say, the fibres composing it are indirectly derived from the posterior roots, but directly from the spongy substance of the posterior cornu of the opposite side. It is therefore an endogenous tract, as is also the

small tract which, according to Schultze, forms a kind of comma in the upper and inner part of the centrum ovale of Flechsig, observed also by Hoche, Achalme, and Theohari, and which possibly coincides with the triangle of Ganbault and Philippe. The fibres comprising it would appear to be designed to unite the upper regions of the medulla with the terminal cone ; some, however, consider

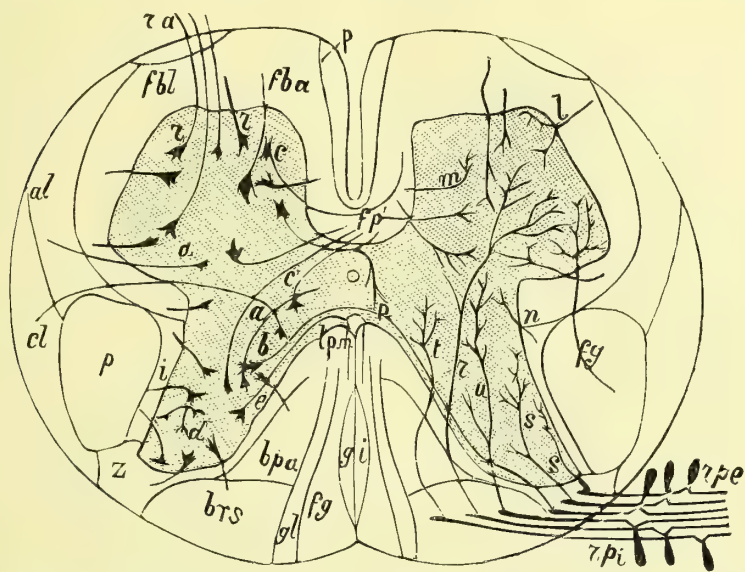


FIG. 20.—SCHEME OF THE ORIGIN AND DESTINATION OF THE FIBRES OF THE NERVE ROOT IN THE GRAY SUBSTANCE OF THE SPINAL MEDULLA, AND OF THE DISTRIBUTION OF THE NERVE CELLS IN THE LATTER.

rpe, Postero-lateral root ; rpi, postero-median root ; p (in the middle of the figure), collateral of a posterior root fibre which reaches the opposite side through the dorsal commissure ; t, collateral of a posterior root fibre in the column of Clarke ; r, collateral of a posterior root fibre to the anterior cornu ; u, collateral to the central gray substance ; s, collateral to the posterior cornu ; n, fibre of the limiting zone terminating in the gray substance ; fp, fp', direct fibres from the lateral and central pyramidal columns to the cells of the anterior cornu ; l, fibre from the fundamental bandelet of the lateral column, and m, analogue from the fundamental bandelet of the anterior column penetrating the gray substance ; e-c, commissural cells ; rr, root cells ; aa, cells of the lateral columns ; bb, cells of the posterior columns ; d, cells of Golgi with short axis cylinders ; fg, columns of Goll ; gi, part of the column of Goll limiting the dorsal section ; gl, intermediary zone (Zwischenschicht) ; brs, bpa, bpm, posterior middle and anterior parts of the column of Burdach ; z, external root region (Randzone) ; p, crossed pyramidal bundle ; p', anterior pyramidal bundle ; cl, direct cerebellar bundle ; al, tract of Gowers ; i, middle bandelet of the lateral column ; fbl, fundamental bundle of the lateral column ; fba, fundamental bundle of the anterior column ; ra, ventral or anterior root.

these fibres to be exogenous, and would regard them as the descending branches of the fibres of the posterior root. According to this view, the two posterior columns would be formed of exogenous fibres in great preponderance ; the direct cerebellar column and the tract of Gowers, on the other hand, are formed of endogenous fibres.

Each of these great sensory paths of the spinal medulla—the posterior median column of Burdach and the ascending lateral

column of Gowers (not to speak at present of the direct cerebellar column which goes directly through the restiform body to the cerebellum) becomes interrupted in an important station, whence issue new paths, which we may consider for the most part as the continuation of the spinal paths to the basal ganglia and the cerebral mantle. These bulbar stations are the so-called nuclei or cell masses of the column of Goll—the cuneiform column and the lateral column. In Fig. 21 the position and relations of these nuclei are clearly shown. All the fibres of the said tracts, however, do not become interrupted in the nuclei in question. More recent researches would seem to demonstrate the existence of fibres passing directly from the lateral columns to the corpora quadrigemina (Schäfer), and of others proceeding through the lateral fillet of Reil to the anterior corpora quadrigemina, and to the optic thalamus (spino-quadrigenal and spino-thalamic fibres—Mott), whilst others detach themselves from the tract of Gowers to pass to the lateral fillet of Reil, and thence to the internal geniculate body and the posterior commissure, or to the external nucleus of the thalamus (Quensel, Solder).

Four large paths exist, then, between the spinal medulla and the higher centres—two posterior tracts, the cuneiform and the gracile, which are for the most part exogenous (*i.e.*, formed of fibres coming from the posterior roots), and two lateral tracts, the direct cerebellar of Flechsig and the tract of Gowers, formed of endogenous fibres (of spinal origin). Besides these tracts, there exist the above-mentioned direct paths, which are not interrupted in the nuclei of the medulla oblongata, and also other endogenous fibres found especially in the rest of the lateral columns.

Some of the conducting paths of common sensibility and their collaterals decussate in the spinal medulla, others are direct. The question of decussation has in recent times given rise to more discussion than ever. While Brissaud, Lloyd, and Raymond still adhere to the doctrine of spinal decussation of the sensory fibres, others, such as Mott, Gutch, and Horsley, Dejerine and Thomas, deny it on grounds of clinical and anatomical facts of great importance. As an instance of the great increase in the doubts and difficulties which the original scheme of Brown-Séquard presented with an intelligible simplicity, it is worth while mentioning the crossed tract of Edinger, who, in two works, has insisted on the presence of secondary sensory fibres, which take origin from the cells of the anterior and posterior cornua, decussate in the anterior commissure, pass into the antero-lateral column of the opposite side, and proceed as an anterior fundamental sensory bundle to the fillet of Reil in the interolivary layer. With such an undecipherable distribution and complication of sensory paths in the spinal medulla, it is rather difficult nowadays to assign to each individual tract and to the gray substance of the posterior cornua

the functions of transmitting specific forms of sensibility; and rather than discuss past and recent hypotheses, I deem it more advantageous, after the mere mention of this question, to turn our attention again to the course of the sensory fibres from the bulb upwards.

From the nucleus gracilis and nucleus cuneiformis originate fibres which, advancing forwards and upwards in a curve with its

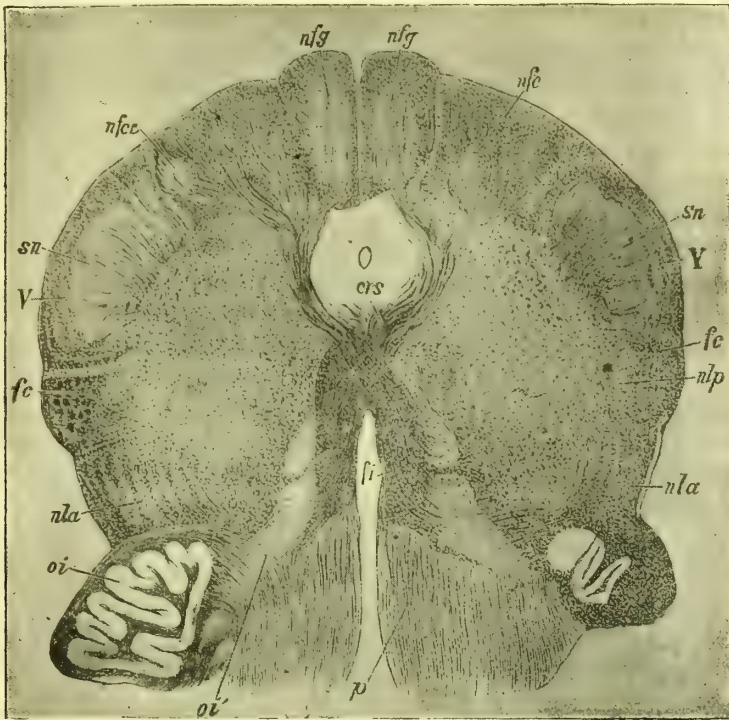


FIG. 21.—SECTION OF THE MEDULLA OBLONGATA AT THE LEVEL OF THE DECUSSATION OF THE LEMNISCUS.

p, Pyramid; oi, inferior olive; oi', superior olive (Nebenolive); nla, nucleus of the antero-lateral column; nlp, nucleus of the postero-lateral column; fc, path of the lateral cerebellar column; V, trigeminus; sn, substantia gelatinosa; nfcce, a part of the lateral nucleus of the cuneiform column; nfg, nucleus of the columnus gracilis; nfc, nucleus of the cuneiform column; crs, posterior or superior decussation; fi, interolivary layer; external to crs and fi is the reticulated gray substance (Bechterew).

convexity outwards, so as to surround the central canal with concentric curves (Fig. 21), decussate at an acute angle behind the pyramids (posterior decussation), to form the interolivary layer or that of the lemniscus. The lemniscus, according to Edinger, would be joined by fibres coming apparently from the anterior column, but having their origin in the posterior and anterior cornua, and arriving at the anterior column by means of the anterior commissure.

It is evident, judging from the constitution, still not quite clear, of the median lemniscus, that, as the result of its crossed relations

Other fibres of the posterior nuclei, especially those coming from the nucleus of the column of Goll (Edinger), pass to the reticulate substance, which, as already noted, contains fibres of the lateral nucleus. If the fibres of the antero-lateral column become interrupted in the latter, one can understand how, besides the lemniscus, the reticulate substance also should be regarded as an important sensory path.

It is evident from what has been said that the majority of the

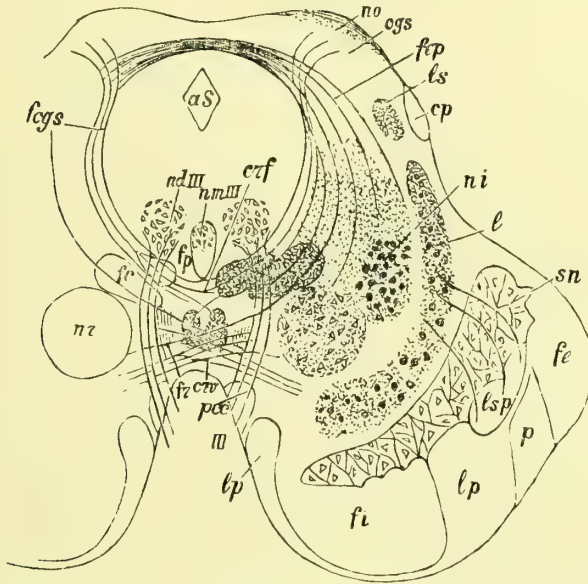


FIG. 23.—COURSE OF THE SENSORY FIBRES TO THE LEVEL OF THE ANTERIOR CORPUS QUADRIGEMINUM.

no, Optic tract ; ogs, anterior quadrigeminate body ; fep, bundles of the posterior commissure ; ls, bundle of the anterior quadrigeminate body to the optic thalamus ; cp, corpus paraventricular ; ni, innominate nucleus ; l, fillet of Reil (lemniscus) ; sn, substantia nigra ; fe, external bundle of the pes of the cerebral peduncle ; p, pyramidal bundle ; lp, accessory lemniscus (Bechterew) ; lsp, bundle given off from the lemniscus, penetrating the cerebral peduncle ; fi, internal bundle of the cerebral peduncle ; III, oculo-motor nerve ; pcc, peduncle of the mammillary body ; crv, ventral decussation of the tegmentum ; fr, fasciculus retroflexus ; nr, red nucleus ; fc, central path of the tegmentum ; fp, posterior longitudinal bundle ; ndIII, posterior nucleus of the oculo-motor nerve ; nm, median nucleus of the oculo-motor nerve ; crf, decussation of fcgs, bundles of the deep medullary substance of the anterior quadrigeminate body ; aS, aqueduct of Sylvius (Bechterew).

sensory fibres of the lemniscus do not pass through the capsule, but are interrupted once in the optic thalamus. Opinions differ concerning this interruption of the sensory fibres in the thalamus, but the experimental data furnished by the researches of Monakow, Singer and Münger, and Mott, enable us to decide in favour of an interruption (free terminations of the respective neurones) in the optic thalamus. *Vice versâ*, the experiments of Ferrier, Turner, and Tschermak would lead us to believe that the fibres of the lem-

niscus pass by the optic thalamus, the internal capsule, the lenticular nucleus, and, lastly, by the external capsule, so as to reach the cortex of the parietal lobe. The results of clinical observation do not all agree. Those of Hösel and Flechsig are antagonistic to those of Mahaim. Hösel supports Flechsig's conclusion that the fillet of Reil (lemniscus) sends fibres directly to the cortex, while Mahaim confirms the results of Monakow's researches. Mahaim has observed that the fibres of the fillet in the calotte are closely mingled with some of the fibres of the subthalamic region, while, on the other hand, the cortical fibres of the fillet, along with other fibres of different origin, penetrate the fenestrated layer of the thalamus and the internal and external medullary laminae, and ramify in the internal and external nuclei of the optic thalamus. The views of Monakow and Mahaim are further supported by the researches of Bielschowsky, Dejerine, Greiwe, Schlesinger, and Mayer. At this point a very important question forces itself upon us for consideration.

We have already said that the lemniscus forms three tracts—the lateral, regarded chiefly as an acoustic sensory path; the median, which is a path of common sensibility; and the third bundle, which might be called the lemniscus of the pes (*pes lemniscus profundo*), and which, according to Dejerine and Long, is annexed or conjoined to the median fillet of Reil, but is composed of a system of fibres which are offshoots from the pes of the cerebral peduncle, and therefore very probably motor. We ought not, however, to regard the lemniscus as a solitary sensory path, because, besides the reticulated substance, other sensory paths exist. On the contrary, according to the most recent researches of Schlesinger, Gee, and Tooth, the fillet of Reil would be placed in the second rank as a sensory path.

Having made it clear that the sensory paths of the median fillet of Reil and the reticulated substance of the pons and tegmentum are interrupted in the optic thalamus, it is easy to understand how there should emerge from it another system of fibres which pass through the internal capsule to reach the cortex. It is through the posterior segment of the internal capsule that the thalamo-cortical fibres pass, and at this point some of them are intermingled with the pyramidal fibres of the limbs (Dejerine). Those, however, which penetrate the thalamus and lenticular nucleus cross the sub-optic and retrolenticular tracts. This tract, meanwhile, must not be considered as exclusively a bundle of common sensibility, because it contains thalamic radiations, fibres of projection proceeding from the occipital and parietal lobes to the central nuclei of the thalamus and the centrifugal bundle of the temporal lobe or bundle of Türk-Meynert.

Still more difficult is the delimitation of a cortical sensory area for common sensibility. For example, Ferrier considers the hippocampus as the cortical area of common sensibility, and Munk holds

the motor zone to be nothing else than a sensory zone for common sensibility. On the other hand, Luciani regards the motor zone as senso-motor, while Monakow and Bechterew locate common sensibility in the parietal lobe. Schäfer, again, assigns to common sensibility a part of the convolution of the corpus callosum, and Hösel considers the Rolandic zone as an ultimate station of the fillet of Reil ; further, there is the very conflicting evidence of not a few clinical observations, including that of Hösel himself, certainly incomplete from the clinical side. Hence, though opinion is far from unanimous, still we are enabled to form some idea of the diverse mechanism, in different cases, of disturbances of sensibility resulting from an apparently identical lesion.

Indeed, while many destructive foci in the Rolandic zone give rise to disturbances of sensibility, insignificant as compared with motor disturbances, other foci produce both paralysis and loss of sensibility for a time. Again, some lesions of the parietal lobe have run their course without important disturbance of sensibility, while in others, on the contrary, such disturbance has been most marked.

Amongst many other cases I recall that of a man, aged fifty-seven, who, after a cerebral attack, with loss of consciousness for a short time, remained hemiparetic on the left side and subject to attacks of vertigo. On examination, I found marked paresis of the left inferior limb, the paresis of the upper limb having almost disappeared ; no paralysis of the face or tongue ; anæsthesia and analgesia of the left upper limb, and also of the lower, as far as the knee ; hypo-æsthesia from the knee downwards ; bilateral homonymous hemianopsia of the left ocular field ; some psychic disturbances, disorientation and confusion. In two cases of a destructive focus in the occipital lobe, somewhat extensive in both, I have likewise found marked hypoæsthesia on the opposite side. It is very probable that in the first case there may have been a destructive focus of the parietal lobe on the right side, deep enough to injure the optic radiations, together with a lesion of some of the fibres of projection of the cortical zone for the inferior limb (more above and behind). The profound anæsthesia, with very slight paresis of the upper limb, not being capable of explanation by a lesion of the Rolandic zone or its fibres of projection, nor being probably due to a small lesion of the internal capsule (as in the case of a crural monoplegia with hemianopsia), must be attributed to the parietal lesion.

As the literature of analogous cases is not at all scarce, and as, on the other hand, it is well known that lesions of the Rolandic zone often produce only motor paralysis, leaving cutaneous sensibility unaltered, it should be agreed (unless contradicted by more rigorous examination in future observations directed towards the determination of not only the extent of the lesion, but also of its exact whereabouts and depth) that, in all probability there exists on the cerebral cortex a very extensive area for common sensibility,

with centres of greater functional intensity, and that the exact situation of these is not fixed and unvarying in the same way as those of sight and hearing, nor do they attain an equal development in all men.

It is evident that one part of the cortical tactile sphere is closely connected with the olfactory zone. The disturbances of sensibility observed after experimental destructions (those of Ferrier, and the large number performed in the psychiatric institute at Naples) of the hippocampus and limbic convolution show what extensive interlocking occurs between the olfactory and tactile zones. On the other hand, the disorders of sensibility consequent upon experimental and pathological lesions of the Rolandic zone bring to light another interlocking between the motor zone and the zone of general sensibility.

The question whether each of the different kinds of sensibility possesses a different and specialized cortical centre has given rise to much discussion. Several observations support only the hypothesis that general and muscular sensibility occupy the same zone as that of the movements, taken in the sense of Boyer and Dejerine, or a zone divisible, as I hold, into centres of greater functional intensity, surrounded by a more or less extensive zone of minor functional intensity or of evolution, which comprises the base of the frontal convolutions, a part of the ascending parietal convolution, and a part of the superior parietal lobule. Shaw observed a case in which a lesion of the centre for the arm produced loss of muscular sense.

The observations of Dana, Henschen, Knapp, Albertoni, and Brigatti point to the same conclusion. Dejerine and E. Long arrive at the same result by different methods. Save for slight differences, nearly all agree that the centre of cutaneous sensibility coincides with the motor zone in its wider signification, comprising, that is, the feet of the frontal convolutions and the part of the parietal lobules nearest to the ascending parietal (Monakow). The researches of Flechsig, also, would lead us to regard this same area as a somæsthetic zone.

In my opinion, an impartial criticism of the facts does not permit of such a definite conclusion. When I think of the many cases of monoplegia and hemiplegia, with preservation of cutaneous sensibility, resulting from cortical or subcortical lesions, of the clinical cases and the experimental facts which point to the limbic lobe as a part of the mantle concerned in the function of general sensibility, it seems to me that we are not warranted in excluding this latter region from the anatomical field of general sensibility.

MOTOR PATHS AND CENTRES

Volitional movement is the resultant of several concomitant forces, one of which represents the fundamental factor, whilst the others prepare, reinforce, and co-ordinate. The movement is effected through a system of fibres which go by the name of direct paths of transmission of the volitional impulses or system of pyramidal fibres or tactile-motor paths.

This system is seen very distinctly in the spinal cord, the medulla oblongata, the pons and the cerebral peduncle, up to the foot of the corona radiata. From this point to the cortex, which is to be considered as the point of departure of the said tract, its fibres spread themselves out, like systems of superimposed fans, intermingling and interlacing in various manners with many others of different origin and function.

In the spinal cord the pyramidal bundle appears at the level of the lumbar enlargement, where it is found in front and to the outside of the posterior cornua, just at the periphery of the cord ; pyramidal fibres, however, are found also further down, even as far as the conus medullaris. Proceeding upwards as a compact bundle to a certain height in the dorsal region (not always to the same level, for there are individual variations), it becomes pushed inwards and covered over by the direct cerebellar tract, at the same time gradually increasing in bulk through the fact that, from above downwards, the pyramidal tract gives off fibres to the nuclei of the anterior *cornua*. In the cervical cord the pyramidal bundle is contiguous with the posterior cornua behind, the limiting zone internally, the direct cerebellar tract externally, and with the tract of Gowers and the mixed zone, or rest of the lateral column, in front.

Another portion of the pyramidal bundle, somewhat smaller than the former, runs along the internal aspect of the anterior column, and is the so-called direct pyramidal tract, or tract of Türk. The tract which runs in the postero-lateral column decussates at the level of the pyramids with that of the other side, while the tract of Türk proceeds directly upwards towards the hemisphere of the same side. The pyramids of the medulla oblongata are thus constituted for the most part by the pyramidal fibres, some crossed, some crossing, some which will cross, and others, lastly, which ascend directly from the medulla to the cerebrum. At the point of junction of the medulla oblongata with the pons the decussation of the lateral pyramidal tract is already almost complete, and the two portions, the stouter crossed and the smaller direct, having now mingled their fibres together, pursue their course in the inferior or ventral aspect of the pons close to the median line.

From the nuclei of the facial and hypoglossal nerves, just as from the cells of the anterior cornua of the spinal cord, there go out

corresponding bundles of fibres which we may consider as short branches of the pyramidal system. They form part of the internal arched fibres of the pons, and run in the posterior half of the pons on the same side as the nuclei from which they take origin; in the anterior half of the pons, however, they decussate and cross to the other side.

In this way the fibres of the long pyramidal bundle decussate at the level of the pyramids, those of the short pyramidal bundle at the level of the anterior and middle part of the pons, and those of the direct pyramidal bundle, or bundle of Türk, which runs in the anterior column, also decussate in the anterior commissure.

Let us stop a little at this point to consider what remains to be said of this part of the motor nervous system from the cortical centres downwards. This will help the reader to a better understanding.

The cerebral cortex, as apparent from the description of the functional regions which we have already discussed, is a compound of organs of different attributes, motor, sensory and, let us say, even purely psychic. The motor function is fulfilled by a somewhat extensive area embracing the Rolandic fissure, and consisting of a central and a surrounding portion. The former is represented by the two ascending or Rolandic convolutions and the para-Rolandic lobule, and is considered as an absolute motor zone, or, more accurately speaking, a motor centre of greater functional intensity. The periphery of the surrounding portion is not definitely limited, but is continued all round for a short distance, blending and fusing with the neighbouring areas, and has been called the relative, latent, or perhaps preferably the evolutive, motor zone. This zone can be only ideally and arbitrarily limited by a plane passing in front of the base of the frontal convolutions, anteriorly, and through the feet of the parietal convolutions, posteriorly.

The prolongation of these two planes to the interhemispheric aspect marks off a cortical field corresponding to the para-Rolandic lobule, and forming also a part of the motor zone. It is only below that the given zone is distinctly delimited, and this is effected by the fissure of Sylvius. On this ample zone there are found the great motor provinces for the muscles of the two limbs, the face, the tongue, as well as the trunk, neck, larynx, etc. (Fig. 24). On the interhemispheric aspect, also, some distinguish several motor areas. The movements of the knees and legs would be represented in the para-Rolandic lobule; those of the feet in the upper part of the quadrate lobule; those of the shoulder and head on the upper margin of the frontal convolution, in front of the para-Rolandic lobule. All these localizations on the internal aspect of the hemisphere are not of an order so precisely defined as those on the external; at least, they are founded upon scattered and by no means reliable observations. On the whole, such a decided delimitation of all the motor and sensory areas is rather artificial. Each muscular region of

the body, as well as each muscular group, possesses a centre of greater functional intensity in the motor zone, properly so-called, but is also more or less represented in a more extensive zone.

Furthermore, they are certainly represented for the most part on the motor zone of the opposite hemisphere. This last statement has been amply demonstrated by me on experimental grounds (*Sulle compensazioni funzionali della corteccia del cervello*, 1883).

The centres of greater functional intensity are distinguished in such a manner as to render their topographical relations sufficiently recognisable in man as well as the higher mammals. To the upper limb there has been assigned the median part of the ascending frontal and ascending parietal convolutions; to the lower limb,

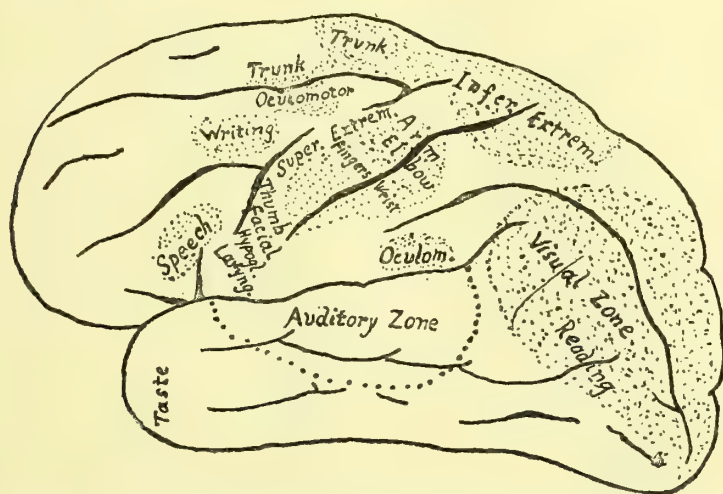


FIG. 24.—CORTICAL MOTOR ZONES FOR THE VARIOUS MUSCULAR REGIONS OF THE BODY AND SENSORY ZONES.

the upper extremity of the ascending parietal, the ascending frontal, and a part of the superior parietal lobule; to the face, tongue, pharynx, larynx, etc., the foot of the ascending frontal, and perhaps also a small part of the inferior frontal convolution (Krause, Massei, Masini). The para-Rolandic lobule is, perhaps, a common centre for the two limbs of the opposite side, but principally for the inferior limb.

Clinical observations agree with experimental data in showing that such centres are not absolute in the true and strict sense of the word. The conception of monoplegia is only relative, inasmuch as a lesion of any particular centre gives rise to paralysis of one given muscular region principally, but not exclusively. An accurate examination of the musculature of the whole side of the paretic limb always brings to light a certain degree of muscular defect in other regions also, but, on the other hand, paralyses from

circumscribed lesions in the cortex are pareses rather than true paralyses.

From the motor areas, or rather from the pyramidal cells which they contain, nerve processes are given off, and the fibres forming the pyramidal bundle are the continuation of these. In the subcortical white substance we find, for a certain distance, the same distinction that exists between the centres of the various muscular provinces; deeper, the distinction is less definite, except in the case of the larger bundles, which are fairly distinct also in the internal capsule, as we shall see. From my experimental and anatomical researches, however, I have elicited the fact that a certain number of fibres constituting the subcortical bundles of the motor zone, which there was reason to consider pyramidal fibres, abandon the ordinary path leading them to the foot of the corona radiata and proceed to the corpus callosum, where they can be followed for a certain distance by the method of experimental degenerations. This small bundle, whose situation D'Abundo and myself were unable to define throughout its whole course, certainly goes, however, to take part in the constitution of the pes pedunculi of the other side, where, in some of our experiments, we found degenerated fibres; it then blends with the pyramidal fibres of the other hemisphere, and so reaches the pyramid, where it undergoes a second decussation, passing into the postero-lateral bundle of the half of the spinal medulla, homonymous with the cerebral hemisphere from which it is derived. Hence we are induced to admit a second order of pyramidal fibres, possibly collateral, which, by their twofold decussation, the first in the corpus callosum and the second at the level of the pyramids, return to the side of the spinal medulla homonymous with the hemisphere from which they took origin. With this conception we can understand better the degeneration of the crossed pyramidal bundle on both sides of the spinal medulla as we observed it both in man and in dogs—in the former as the result of gross destructive foci in the motor centres or the subcortical pyramidal paths, in the latter as the result of extirpation of the motor zone.

The passage of a certain number of pyramidal fibres into the corpus callosum, and their recrossing at the level of the pyramids, detracts in no wise from what has been already laid down concerning the direct pyramidal bundle, seeing that I have been able to prove from a series of experiments that when, as the result of excitation of the exposed motor zone, movements occur on the same side as the excited hemisphere, these do not all disappear, but merely become limited on section of the anterior portion of the corpus callosum. On the other hand, the observation of nerve processes (collaterals) belonging to the pyramidal cells and proceeding to the corpus callosum (Marchi), and the researches of Brown-Séquard, which should have led to the admission of the excitability of the

corpus callosum, agree with those very conclusive results of mine before mentioned, and warrant us in considering it probable that the corpus callosum is one of the indirect paths of the motor fibres.

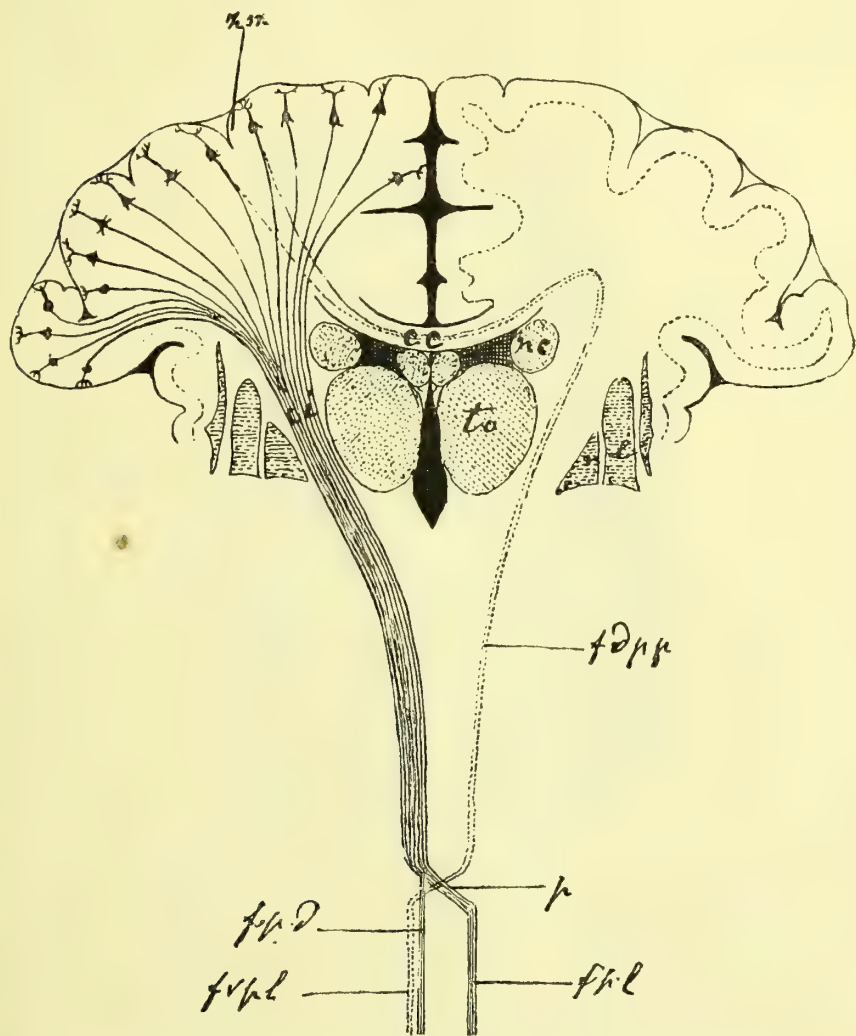


FIG. 25.—SCHEME SHOWING THE COURSE OF THE PYRAMIDAL PATHS.

zm, Motor zone; nc, caudate nucleus; to, optic thalamus; nl, lenticular nucleus; cc, corpus callosum; ci, internal capsule; fdpp, degenerated fibres in the pes pedunculi of the side opposite to the injured hemisphere; p, pyramid; fpl, lateral or crossed pyramidal bundle; fpd, direct pyramidal bundle; fvpl, lateral pyramidal bundle after recussation.

Fig. 25 well represents the course of such fibres, partly demonstrated, partly assumed.

An almost identical hypothesis was put forward by Tenchini in referring to a work of Ugolotti at the congress of anatomists held in the summer of 1901 at Pavia, on the ground that in some cases of

destructive foci of the nuclei of the motor zone he discovered re-decussation of some of the degenerate fibres passing to the pyramid of the same side as the injured hemisphere. Only, it is strange that he has shown ignorance of the experimental facts and anatomical researches which fourteen years ago enabled D'Abundo and myself to formulate a similar hypothesis—the only one, indeed, which



FIG. 26.—HORIZONTAL SECTION OF THE LEFT HEMISPHERE THROUGH THE BASAL GANGLIA AND THE INTERNAL CAPSULE.

c, Caudate nucleus ; nl, lenticular nucleus ; to, optic thalamus ; cl, claustrum ; can, tail of the caudate nucleus ; 1, 2, 3, internal middle and external nuclei of the lenticular nucleus ; lmi, lme, internal and external medullary laminae ; ci, posterior segment of the internal capsule ; ei, anterior segment of the internal capsule ; qci, genu of the internal capsule ; ce, external capsule ; R, island of Reil.

seems to give a really plausible interpretation of the bilateral degeneration of the pyramidal bundle following a mono-hemispheric lesion, taking into account, as it does, the degenerate fibres discovered by Marchi, Algeri, and others in the corpus callosum and in the pes pedunculi, on the side opposite to that of the hemispheric lesion, and those passing, according to Ugolotti, from the opposite to the homonymous pyramid. Besides, these fibres would be the paths by which excitation of a hemisphere produces bilateral movements, since it now appears demonstrated that at least a part of the

fibres of the direct bundle of Türk also undergo decussation in the anterior commissure of the spinal cord.

The greater part of the pyramidal bundle, however, continues its way into the hemisphere, and, gathering itself increasingly into a compact bundle, constitutes the internal capsule.

This is found as a strip of white substance enclosed between the nuclei of the base, and forming an angle pointing inwards (Fig. 26). It is consequently divided into two distinct segments—an anterior, included between the caudate and lenticular nuclei, and a posterior, between the lenticular nucleus and the optic thalamus, besides a sub- or extra-lenticular part. The meeting-point of the two segments forms an obtuse angle, and goes by the name of the 'genu' of the capsule. Looked at from above downwards, it is divisible into a thalamic portion, properly so-called, and a subthalamic portion. The former is comprised between the nuclei; the subthalamic portion, as is easily understood, forms a part of the posterior segment, the particulars of which we shall investigate more fully.

In this part of the central nervous system also it is possible to distinguish, by the help of clinical observations and experimental researches, areas of diverse physiological function corresponding in a certain manner to the functional differences of the cortex of the brain. The anterior segment is formed principally of lenticulo-caudate fibres and of fibres with a horizontal and oblique direction, coming from the cortex, and almost all ending in the optic thalamus, of which they form the anterior peduncle (Dejerine). According to the researches of Dejerine, not only does it contain no sensory fibres, but even motor fibres (Charcot) are absent.

According to some authorities, this tract of the capsule would contain also the projection bundle passing from the frontal lobe to the optic thalamus and pons varolii. It certainly contains cortico-thalamic fibres of projection, but it still remains to be shown that it affords passage to fibres proceeding directly from the frontal lobe to the pons. In fact, while with Weigert's method I have observed degenerated fibres in the anterior segment of the capsule, after extirpation of the frontal lobe, such degeneration is entirely absent in brains treated with Marchi's method.

The existence of this large bundle, which I have not succeeded in demonstrating, and which I consider hypothetical, has been re-asserted on all sides, and in recent times more especially by Bechterew, as is clearly set forth in his diagram (Fig. 27). As regards this bundle, it is well to come to some understanding. If by it we wish to indicate with Dejerine, and more particularly with V. Gehuchten, the fibres of projection of the pre-Rolandic motor zone (latent, evolutive), which become blended with the rest of the pyramidal bundle in passing through the posterior segment of the internal capsule, I quite agree, since in one case which came under my observation—a case of mutilation of the frontal lobe a little behind the

prefrontal sulcus—I found a certain degree of degeneration in the genu and in the anterior tract of the lenticulo-optic segment of the internal capsule. But if we are to understand, as previously asserted on insufficient grounds, a bundle of fibres coming from the prefrontal lobe, and passing through the anterior segment of the capsule to reach the innermost bundle of the pes pedunculi, and hence the pons, as Bechterew states in his treatise, I must state in opposition that a considerable number of observations of my own, based on the examination of a large number of serial sections from the brains of monkeys that had suffered mutilation of the frontal lobes, show integrity of the internal capsule, and of the pes pedunculi throughout its whole extent. *There are no relations, either direct or*

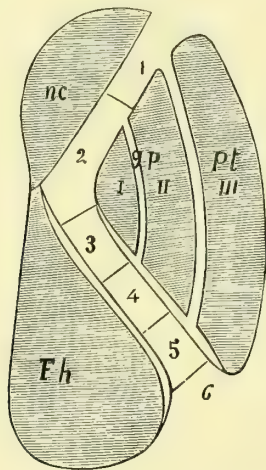


FIG. 27.—SCHEME OF THE TOPOGRAPHICAL DISTRIBUTION OF THE BUNDLES OF FIBRES IN THE INTERNAL CAPSULE. (AFTER BECHTEREW.)

nc, Nucleus caudatus ; gp, globus pallidus ; pt, putamen of the lenticular nucleus ; 1, fibres going direct to the anterior segment of the thalamus ; 2, fibres from the frontal lobe to the pons (?) ; 3, paths of the fibres of the motor nerves of the brain (facial and hypoglossal) ; 4, pyramidal paths ; 5, sensory paths ; 6, paths from the temporo-occipital lobe to the pons.

indirect, between the prefrontal lobe and the pes pedunculi ; they can hardly be admitted by the slow method of degeneration (Weigert, Pal) in the anterior tract of the internal capsule, and if any degenerate fibres are discovered there, they are in all probability fronto-thalamic (Bianchi).

In the genu and a small tract of the posterior segment the fibres are mostly those coming from the cortical centres for the face and tongue. They come from the Rolandic and frontal portions of the operculum (foot of the inferior frontal and of the Rolandic convolutions), pass through the genu of the capsule, and arrange themselves in the inner segment of the pes pedunculi. According to Bechterew, the fibres of the median accessory lemniscus also pass through this tract of the capsule. The posterior or lenticulo-optic

segment, then, presents essential features of its own. In fact, if in the imagination we divide this segment into two parts, an anterior and a posterior, we will be able to assign with certainty to the former the signification of paths of the motor fibres for the limbs of the opposite side (pyramidal system), and to the latter the signification of paths of the sensory fibres for the opposite side of the body (thalamic and thalamo-cortical system). We have already said that a portion of the sensory fibres mingles with the pyramidal fibres in the capsule.

More recent studies have demonstrated the fact that the pyramidal fibres in these parts of the posterior segment of the capsule do not wholly intermingle. Dejerine, in eleven cases of cortical lesions followed by secondary degenerations in the capsule and in the pes pedunculi, succeeded in determining more clearly than any other the position of the degenerated portion of the pyramidal fibres in the capsule. In cases of lesions in the middle part of the two ascending convolutions, and in the posterior extremity of the second frontal, the degeneration in the above-mentioned thalamic region occupied the middle third of the posterior segment; the anterior and the retro-lenticular segments of the capsule were intact. In the pes pedunculi the degeneration occupied the second inner quarter. In four cases of a localized lesion of the superior third of the Rolandic region and the foot of the first frontal convolution the degeneration occupied, in the thalamic region, the posterior part of the posterior segment, which, further behind, contained several normal fibres, while in the inferior thalamic region, in consequence of the arrival of the bundle of Türk, the degenerated tract was found displaced further forwards; the posterior fifth of that segment was intact. In the peduncle the zone of degeneration occupied the third quarter of the pes, counting from within outwards.

In two cases of localized lesion of the extreme upper portions of the Rolandic convolutions, including the paracentral lobule and the anterior extremity of the parietal lobe, the zone of degeneration occupied the hindmost portion of the thalamic segment, while in the subthalamic region, in consequence of the appearance of the normal bundle of Türk, the degenerated zone was pushed a little in front. The retro-lenticular segment was normal. In the pes pedunculi the degeneration was limited to the inside of the bundle of Türk, and consequently was seen as a zone a little more external to that occupied in the preceding cases, and corresponding exactly to the fourth fifth of the pes, reckoning from within outwards.

The posterior segment of the capsule, properly speaking, forms by itself the inner four-fifths of the pes pedunculi, and has assigned to it, as already seen, the retro-lenticular portion, composed of sensory fibres, horizontal fibres going to the pulvinar, others going to the external geniculate body to form the stratum zonale, and others, again, going to the anterior quadrigeminate body. Through this

last tract of the postero-inferior part of the posterior segment of the capsule there pass likewise the fibres constituting the so-called bundle of Türk; these arise from the cortex of the first and second temporal convolutions and also from the occipital lobe, pass through the tract of the capsule, marked in Fig. 27 by the number 6, locate themselves at the outermost margin of the pes pedunculi, and become lost in the pons. The function of this bundle is still unknown.

From the capsule the motor fibres next pass into the pes pedunculi, preserving the same order of distinction that has been noted in the capsule itself. On the pes pedunculi, however, one can distinguish a more internal bundle, which, it is held, might be constituted by fibres proceeding from the frontal lobe to the pons; it is, however, of very obscure origin (Fig. 23, *f i*). I have never found it degenerated in any of the numerous sections of the brains of monkeys from which I had previously extirpated the frontal lobes. In all probability it corresponds to the peduncular path for fibres coming from the foot of the second and third frontal convolutions, and from the facial, hypoglossal, and pharyngeal nerve centres. Next come the peduncular divisions of the pyramidal bundle, one immediately after the other, preserving the disposition already mentioned.

The pyramidal fibres of the pes pedunculi become somewhat scattered in their passage through the pons. The middle bundle is very distinct and fairly compact, and runs close to the inferior aspect of the pons, above the external arcuate fibres and near to the raphe; the fibres given off from the pyramidal bundle to the nuclei of the cranial motor nerves are found higher up.

While the pyramidal fibres of the limbs run in the half of the pons corresponding to the hemisphere from which they originate, those of the facial and the other cranial motor nerves (hypoglossal, a part of the vagus, the masticatory, the facial) decussate higher up, so that in the posterior half of the pons we find the pyramidal bundle for the limbs of the homonymous hemisphere, and the bundle of the facial and the other cranial motor nerves belonging to the other hemisphere. The pyramidal bundle for the limbs constitutes the pyramid of the medulla oblongata, at which level the decussation of its fibres becomes evident for a greater or less extent.

Considering now the relations set up between one pyramid and the spinal medulla after the decussation, we can assert that the pyramid transmits to the spinal medulla—(1) the crossed pyramidal fibres coming from the opposite hemisphere; (2) the crossed pyramidal fibres coming from the homonymous hemisphere, and undergoing their first decussation in the corpus callosum—*homolateral* fibres (these and the preceding are situated in the postero-lateral columns of the spinal medulla); (3) the direct fibres passing from the hemisphere of one side, and even perhaps simply from the pyramid (the bundle of Pitres, more fully studied recently by Rothmann), without decussation, into the spinal medulla, where they run

in the anterior column constituting the bundle of Türk, or direct bundle. As before mentioned, the fibres of this bundle, in the opinion of some—*e.g.*, Van Gehuchten—decussate completely in the anterior commissure. According to Lenhossek, no such decussation exists, while Ziehen admits a partial decussation, and holds that the fibres subserve the muscles of the trunk, and that in consequence each hemisphere is in connection with the muscles of both sides of the trunk.

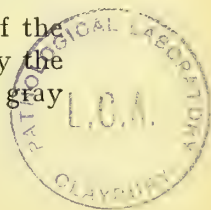
All these motor strands are interrupted by the cells of the anterior cornua of the spinal medulla, where the pyramidal fibres, or, if otherwise preferred, the cortico-pyramidal neurones, terminate; the axis-cylinder prolongations of the cells of the anterior cornua then give origin to the fibres of the anterior roots.

The cerebrum, however, is in connection with the spinal medulla by means of another class of fibres, also motor, but secondary, inasmuch as they reach the spinal medulla from the cerebellum.

These are the so-called cerebello-motor paths, and two orders of neurones are herein concerned; the first goes from the cerebrum to the cerebellum by means of the middle cerebellar peduncle; the second from the cerebellum to the anterior cornua of the spinal medulla, by means of the same peduncle. The former, in its turn, comprises two kinds of neurones; one goes from the cortex of the cerebrum to the gray nuclei of the pons of the same side, and the other arises from the gray nuclei of the pons, decussates in the raphe with the homonymous one of the other side, and passes across the middle cerebellar peduncle to the cerebellar hemisphere of the opposite side. The fibres of the first type descend from the cerebrum to the pons (V. Gehuchten), which explains why experimental destructions of the cerebellum have not produced degeneration of them on that side of the pons (Vejas, Mingazzini).

The question of the exact part of the cerebral mantle that furnishes the cortico-pontine fibres has given rise to a great deal of discussion. In the past it has been held, without any proof, that the fibres in question came from the cortex of the frontal lobe; the researches of Zacher, Dejerine, Flechsig, as well as my own (*Le degenerazioni discendenti endoemisferiche seguite alla estirpazione dei lobi frontali*, *Annali di Neurologia*, 1895), although contradicted by the more recent ones of Rutishauser, demonstrated with sufficient clearness that it is not the prefrontal lobe which sends the fibres to the pons. It can hardly be admitted that such fibres come from the evolution motor zone—that is to say, from the base of the second and third frontal convolutions, where they join the ascending frontal convolution.

They pass through the genu and the posterior segment of the capsule, partly mixed with the other motor fibres, and occupy the inner segment of the pes pedunculi, whence they proceed to the gray substance of the pons.



The nerve-prolongations of the cells of the gray substance of the pons nearly all decussate, and constitute the fronto-cerebellar fibres which proceed to the cortex of the cerebellum. All the fibres going from the cerebral to the cerebellar cortex constitute the first order, using Van Gehuchten's term, or, in other words, *the upper portions of the secondary tacto-motor path*.

The course pursued by the fibres going from the cerebellum to the cells of the anterior cornua of the spinal medulla is not so well known, and we have even little or no knowledge of the part of the cerebellum from which they take origin. According to some, they descend through the inferior cerebellar peduncle to the lateral column of the same side (Marchi, Thomas); or they are represented by two neurones—one cerebello-olivary, the other olivo-medullary (Kölliker)—which arrive at the medulla by means of the middle cerebellar peduncle and the pons (Cajal), and have their primary origin in the dentate nucleus (Thomas). These are the principal theories. What is important is that, besides the *cortico-spinal paths* (direct), it is probable that there also exist *cortico-ponto-cerebello-spinal paths* (indirect).^{*} These two kinds of fibres, the cortico-spinal and the cortico-cerebello-spinal, proceed together from the cortex as far as the pons, where they separate, each to pursue its own course.

A lesion limited to one of the two orders of fibres leaves active the influence of the will upon the spinal medulla, and hence on the muscles. In this case there will not be a true paralysis. If the indirect cerebello-spinal paths are injured inco-ordination results; if, instead, the pyramidal or cortico-spinal paths are injured we have muscular spasm, as in Little's disease. In both cases a true paralysis will be absent. If, however, both are injured, there will be a true paralysis, as happens in lesions of the cortex, of the internal capsule, and in transverse lesions of the spinal cord.

ASSOCIATIVE PATHS

The efficacious working of the various cortical zones would not be conceivable, nor would their complex products and contributions be obtained if the innumerable workers which each of them employs in their respective and manifold laboratories were not in relation with one another, or, in other words, if the various functional zones were not strictly co-related by numerous paths, and, above all, if they were not in harmony throughout every movement of psychic life, or were not all connected with the zone concerned in the synthesis of cortical work—that is to say, with the frontal lobes.

^{*} I have said 'it is probable,' for, in spite of the numerous statements in support thereof, admirably summarized by Soury, the motor nature of the cortico-ponto-cerebellar paths is far from being conclusively demonstrated.

When we examine under the microscope a section of cerebral cortex prepared after the method of Weigert or Pal, there may be seen among the layers of cells, especially the deeper ones, or in the subcortical substance, not only bundles of fibres of projection, which tend to reunite like the ribs of a fan, but also a dense network of myelinated fibres, some short, some long, but all pursuing the most diverse directions, intercrossing in every direction and forming a very dense reticulum, as depicted in Fig. 28.

This network of fibres, running in the most diverse directions, gives at once an idea of the infinite anatomical relations existing between the various regions of the brain.

Apart from what will be said of the intimate structures of the

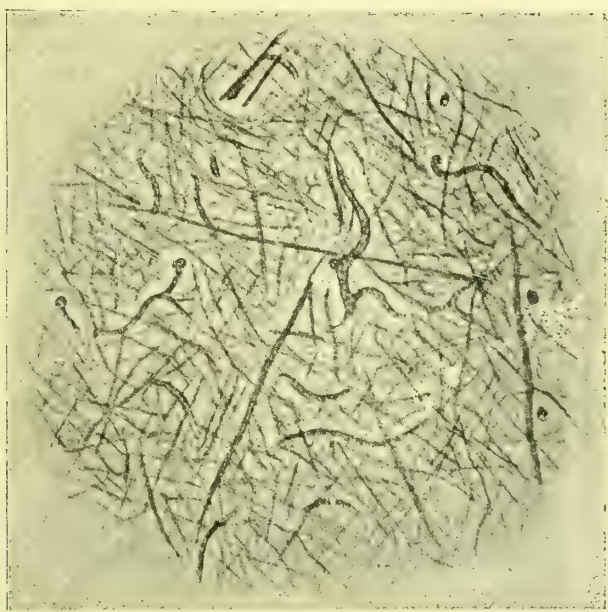


FIG. 28.—NETWORK OF MYELINATED NERVE FIBRES IN THE CEREBRAL CORTEX.

cerebrum, it is requisite at this point, in so far as the object and practical nature of this work permit, to speak more especially of some bundles which establish certain long and direct associative paths between distant cerebral provinces, and a knowledge of which facilitates the interpretation of the facts that we must dwell upon in the ensuing chapters.

We will not take up time, then, in describing the long and short associative fibres, which, assuming a U-like curve (arched fibres of Arnold), extend between one convolution and the adjoining, embracing the intervening sulcus and establishing relations now regarded as indispensable between the two convolutions.

We shall occupy ourselves only with those bundles which modern morphology has more definitely emphasized, and an acquaintance

with which facilitates immeasurably the interpretation of both the normal and pathological phenomena of cerebralization.

Among the systems of association we can include the corpus callosum, the anterior commissure, and the transverse fornix of Forel.

Of the anterior commissure we have spoken sufficiently in the chapters dealing with the olfactory apparatus (Fig. 11).

The corpus callosum is a commissure, or a system of inter-hemispheric associations, and is divisible into several parts—the knee, the beak, the body, and the pad.

The beak (*rostrum*) of the corpus callosum is composed of fibres from both sides, which decussate and establish relations between the orbital portions of the frontal convolutions of either side.

The knee (*genu*) is formed of fibres which come from the external, orbital, and internal aspects of the frontal lobe, and converge towards the antero-external angle of the lateral ventricle. According to some (Schnopfhagen), the genu would also contain fibres of the arcuate bundle, reuniting the frontal lobe of one side with the temporal lobe of the other. We shall see directly how improbable is such a hypothesis.

The body (*corpus*) of the corpus callosum is formed of fibres coming from the whole external face of the frontal lobe, from the Rolandic convolutions, from the whole parietal lobe, from the posterior part of the temporal lobe, from the insula through the medium of the external capsule, and from the precuneus. The fibres composing it put into relation with one another, not only symmetrical, but also asymmetrical regions of the two hemispheres.

The pad may be divided into three parts—a superior, continuous with the body; an intermediate (or posterior extremity of the corpus callosum, called also *posterior genu*); and an inferior or recurved portion, called also the *splenium*. The intermediate (or posterior) and the inferior parts are composed of fibres coming from the infero-internal and the external aspects of the occipital lobe, forming the *forceps major* and *forceps minor*.

The true endo-hemispheric associative bundles are those which establish associative relations between cortical provinces of the same hemisphere. These we shall describe below as briefly as possible.

The *cingulum* belongs to the system of the rhinencephalon, forms a part of the white substance of the limbic lobe, and, as it follows the direction of the latter, is likewise arched. It takes origin from the frontal lobe, covers the genu, body, and splenium of the corpus callosum, curves round into the inferior limbic lobe, and, crossing the hippocampus, reaches the extremity of the uncinate convolution. It receives fibres from all the cerebral regions which it traverses, and especially from the first frontal convolution, the paracentral lobule, the precuneus, the cuneus, the lingual and fusiform lobules, and the temporal pole, and gives off its own fibres to

the same parts. It is formed mostly of short fibres, or, at least, fibres not so long as the whole limbic lobe. In fact, Beevor maintains that it is formed of at least three associative bundles—an anterior, a horizontal, and a posterior. The anterior would put the anterior perforated space and the inner olfactory root (its cortical centre) into relation with the anterior extremity of the frontal lobe; the horizontal bundle would bring the external and internal aspects of the frontal lobe into relation with the first limbic convolution; the posterior bundle, occupying the region of the hippocampus, unites

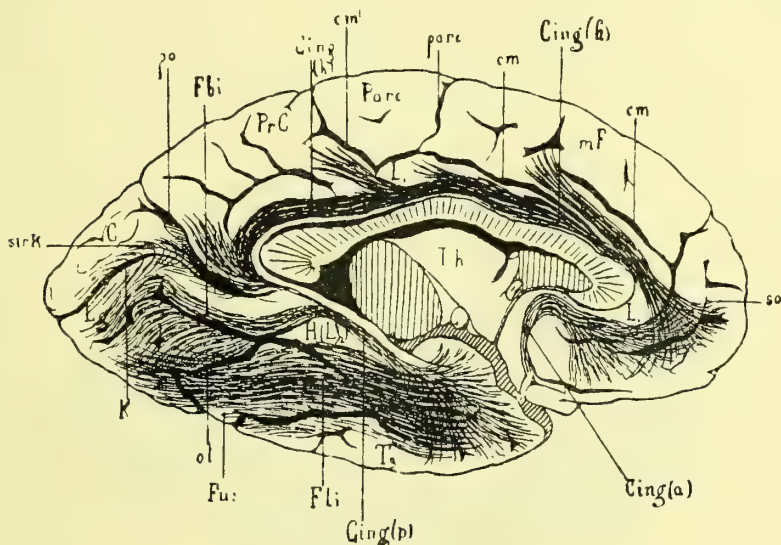


FIG. 29.

C, Cuneus; Cing(a), anterior bundle of the cingulum; Cing(h), horizontal or superior bundle of the cingulum; Cing(k), posterior bundle of the cingulum; Cing(p), inferior bundle of the cingulum; cm, calloso-marginal sulcus; cm¹, vertical branch of the calloso-marginal sulcus or ramus subpariet.; Fbi, internal basal bundle of Burdach; Fli, inferior longitudinal bundle; Fus, fusiform lobule; H(L), hippocampus; K, calcarine fissure; L, convolution of the corpus callosum; Lg, lingual lobule; mF, internal aspect of the first frontal convolution; ot, collateral sulcus; Parc, paracentral lobule; Po, parieto-occipital fissure; PrC, præcuneus; so, supra-orbital sulcus of Broca; strk, calcarine layer; T₃, third temporal convolution; Th, optic thalamus. (From Dejerine.)

the hippocampus and the point of the temporal lobe to the lingual and fusiform lobules.

I have found many degenerated fibres in the cingulum, and traced them from before backwards for a long distance, after extirpation of the frontal lobe (*vide Recerche sulle degenerazioni discendenti sequire all' estirpazione del lobo frontale*, Bianchi).

Uncinate Bundle.—This is composed of fibres arising from the orbital convolutions of the frontal lobe, from the anterior perforated substance, and from the orbital and external aspects of the third frontal convolution. Taking a more or less markedly curved course, they turn round the end of the Sylvian fissure, and run in a direction

from behind forwards towards the extremity of the temporal lobe, some of the fibres traversing the anterior part of the external capsule (Fig. 30).

In my opinion, the uncinate bundle is only one part of a system of fibres commencing at the inferior and external aspects of the frontal lobe, uniting together into a more or less compact bundle, and continued, in a more scattered form, into a system of fibres, some of which are projected from the frontal and Rolandic operculum into the outermost capsule (*capsula extrema**), while others pass through the external capsule, whence, curving under the insula and forming also a kind of **U** upside down, they reach the temporal lobe, and, in preference, the first temporal convolution.

The Superior Longitudinal or Arcuate Bundle.—This is seen

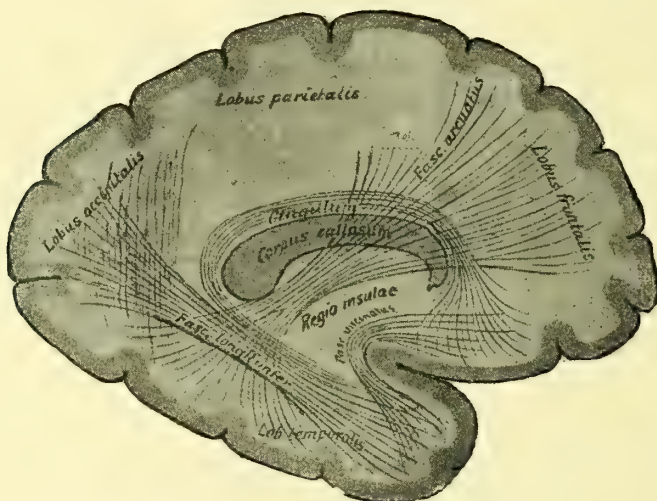


FIG. 30.—SCHEME OF THE CHIEF BUNDLES OF ASSOCIATION.

on the external aspect of the centrum ovale, close to the cortical gray substance, in a vertical fronto-occipital section. According to Meynert, its fibres would bring the Rolandic operculum and that of the third frontal convolution, besides the external aspect of the frontal lobe, into relation with the external aspect of the temporo-occipital region. According to Schnopfhagen, it would be a crossed bundle, an extension of the corpus callosum, and would put in relation the temporo-occipital lobe of one side with the frontal lobe of the opposite. This last opinion is not confirmed by my observations, inasmuch as, in a long series of sections of brains which had undergone mutilation of the frontal lobes, I have been able to follow a small fasciculus of the arcuate bundle which degenerates on the same side; this fasciculus is projected into the external capsule, and

* The narrow strip of white matter between the *claustrum* and the *island of Reil* (vide Fig. 26) is called the '*capsula extrema*' (J. H. M.).

gradually diminishes in bulk in proportion as the fibres composing it become scattered in the temporal lobe. Consequently, I partly agree with Dejerine, who considers this bundle composed mostly of short fibres. I would add, however, that besides the short fibres, which are in the majority, there are some long ones which establish more direct relations between the frontal and parieto-temporal lobes (Figs. 31 and 32).

The two figures here shown are taken from two monkeys' brains treated, one by Weigert's method, the other by Marchi's, and both show degeneration of a bundle of the external capsule which comes

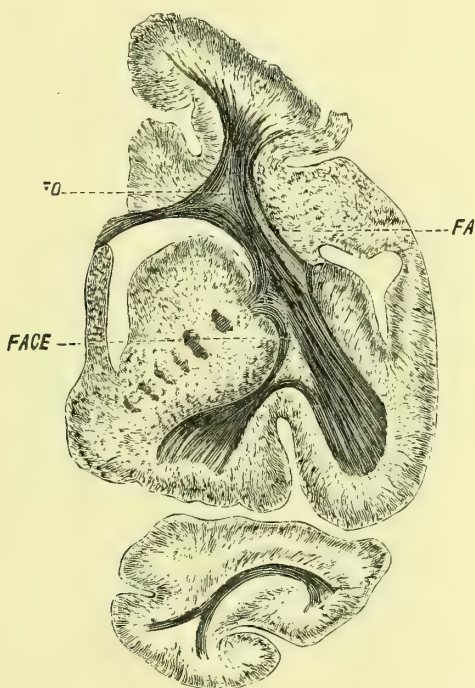


FIG. 31.

FO, Fronto-occipital bundle; FA, arcuate bundle; FACE, arcuate bundle which becomes projected into the external capsule.

from the arcuate bundle. Marchi's method permits a clear demonstration of the course of this bundle, belonging, without doubt, to the system of the superior longitudinal bundle, and shows that, after passing through a tract of the external capsule, it becomes projected into the parietal and temporal lobes.

The Occipito-frontal Bundle.—In brains that have undergone mutilation of the frontal lobes, and have subsequently been treated by either Weigert's or Marchi's method, in addition to a large quantity of fibres running into the somæsthetic zone, and diminishing in number in proportion as we proceed in sections from before backwards, two bundles in particular are found exhibiting degeneration

in the serial sections—one to the outside of the foot of the corona radiata and the centrum ovale, belonging to the system of the superior longitudinal bundle, is projected into the external capsule ; the other, much more internal, runs on the head of the nucleus caudatus, is intersected by fibres of the corpus callosum, and can be followed for a long distance, preserving almost always the same relations ; this is the so-called *fronto-occipital bundle* of Forel and Onufrowicz.

My researches have shown how this bundle has nothing in common

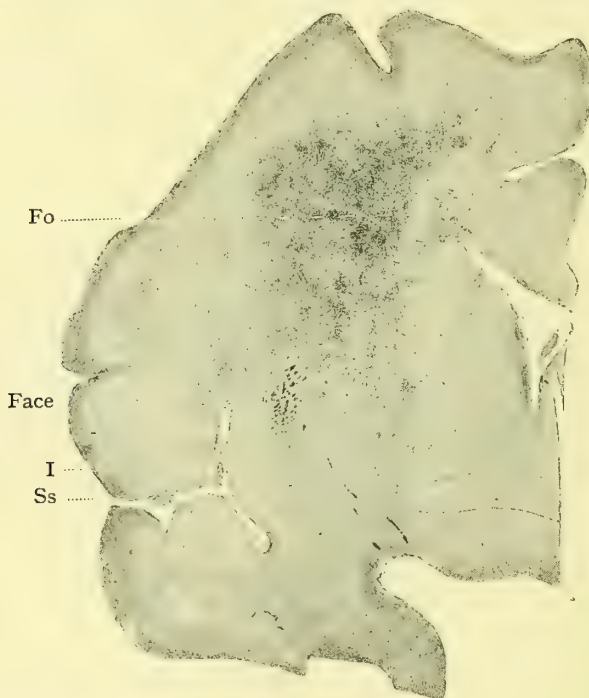


FIG. 32.—VERTICAL SECTION OF A BRAIN OF A MONKEY IN A PLANE CORRESPONDING TO THE ANTERIOR ROLANDIC CONVOLUTION.

Fo, Fronto-occipital bundle ; Face, portion of the arcuate bundle in the external capsule ; I, insula ; Ss, fissure of Sylvius.

with the arcuate bundle. It is separated from the ventricular cavity by means of the subependymal gray substance, and is found, in contrast with the other, at the internal part of the corona radiata. Throughout its course this bundle sends no fibres either to the corpus callosum—the fibres of which intersect, almost at a right angle, those of the bundle in question—or to the nucleus caudatus. Unlike Wernicke, I have not been able to follow a true projection of fibres of this bundle into the internal capsule. Above all, Weigert's method shows us that the internal capsule contains a few degenerated fibres, but it is not improbable that these come directly from the posterior part of the frontal lobe, and are seen when the section

has fallen too near the anterior Rolandic convolution ; only in some sections is it possible to observe the passage of a few fibres from the fronto-occipital bundle to the internal capsule. At the level of the tail of the caudate nucleus this bundle becomes scattered, and more difficult to follow by the method of consecutive degenerations, because of the fact that it is becoming always more and more intersected by other systems of fibres. Dejerine speaks of fibres which detach themselves from this bundle to reach the external capsule. I have reason to believe that, as recently mentioned, the degenerated fasciculus found in the external capsule belongs to the arcuate bundle, and hence has nothing to do with the occipito-frontal bundle. It is true, however, that some degenerated fibres are found in the tapetum, but such fibres are demonstrable by Weigert's method only, while Marchi's does not disclose them ; that is to say, in all probability the degeneration of the tapetum is secondary and indirect.

With such systems of fibres, the frontal lobe assumes associative relations with almost the whole cerebral mantle. In fact, it is brought into relation with the motor or somæsthetic zone by a very large number of fibres, which spread themselves out to form something like a cone with the apex at the frontal pole ; with the temporo-parietal lobe it establishes direct relations, through the medium of that part of the arcuate bundle which passes through the external capsule ; with the occipital lobe a connection is formed by means of the fronto-occipital bundle ; with the limbic lobe by means of the cingulum ; with the anterior part of the temporal lobe by means of the arcuate bundle.

The Inferior Longitudinal Bundle.—This bundle extends from the occipital to the temporal pole, while along its course it gives off a large number of fibres to the occipital convolutions, and especially to the cuneus, the fusiform and lingual lobules, and, on the other hand, to the angular gyrus, to the second parietal convolution, and to the temporal convolutions. From this it seems clear that this bundle is composed of long and short fibres, and establishes associative relations between two great cortical provinces—the occipital on the one hand and the parieto-temporal on the other (Figs. 30 and 33).

The occipital lobe possesses a system of associative fibres of its own, divisible into five bundles, which are :

(a) The *calcarine layer*, consisting of vertical fibres forming a thick layer of white substance attached to the cuneus, and uniting the superior to the inferior lip of the calcarine fissure, and the internal aspect of the cuneus to the lingual convolution. It is quite natural that this bundle should consist of fibres of different lengths, according to the distance of the parts connected, and it must extend from the occipital pole to the limbic lobe.

(b) The *vertical or perpendicular occipital bundle* of Wernicke connects the superior with the inferior border of the occipital lobe—

that is to say, the first occipital convolution with the third and the fusiform lobule. It extends to the parietal lobe, diminishing in bulk, and unites the angular gyrus to the second and third temporal convolutions.

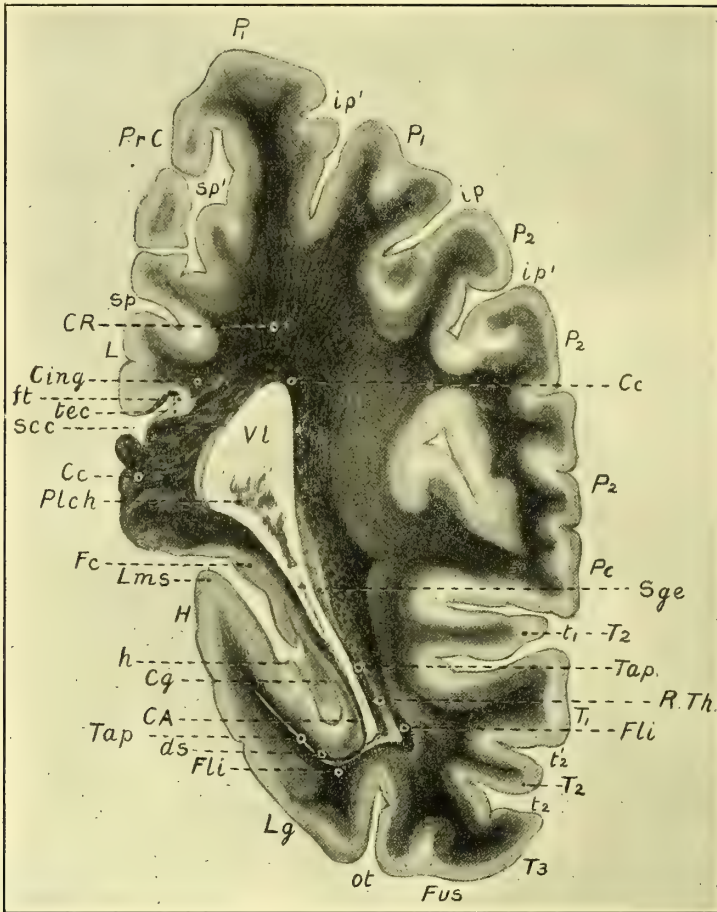


FIG. 33.

CA, Cornu ammonis; Cc, corpus callosum; Cg, dentate convolution; Cing, cingulum; CR, corona radiata; ds, diverticulum of the subiculum; Fc, fasciculus cinereus; Fli, inferior longitudinal bundle; Ft, tangential fibres; Fus, fusiform lobule; H, convolution of the hippocampus; ip, ip¹, interparietal sulcus and its indentations; L, first limbic convolution; Lg, lingual lobule; Lms, superficial medullary lamina; ot, collateral sulcus; P₁P₂, first and second parietal convolutions; Pc, angular gyrus; Plch, choroid plexus; PrC, precuneus; RTh, thalamic radiations of Gratiolet; scc, sinus of the corpus callosum; sp, sp¹, subparietal fissure; Sge, subependymal gray substance; T₂T₃, second and third temporal convolutions; t₁t₂, first and second temporal sulci; t₁¹, indentation of the second temporal sulcus; Tap, tapetum; tec, tania tecta; VL, lateral ventricle. (From Dejerine.)

(c) The *transverse occipital bundle of the cuneus* (Sachs) is composed of fibres arising from the superior lip of the calcarine fissure (cuneus), and projecting themselves transversely outwards, thus

uniting the cuneus to the convexity and to the infero-external border of the occipital lobe. According to Sachs, some fibres of this bundle reach the superior parietal lobule and the angular gyrus.

(d) The *transverse occipital bundle of the lingual lobule of Violet* is analogous to the preceding bundle, but takes origin from the inferior lip of the calcarine fissure; its fibres also reach the external face of the occipital lobe.

(e) The *cuneate layer proper* (Sachs) is formed of fibres running from the superior lip of the calcarine fissure to the upper border of the hemisphere.

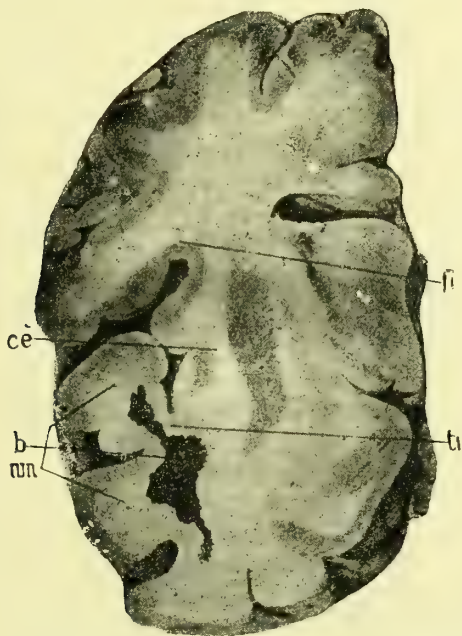


FIG. 34.—VERTICAL SECTION CORRESPONDING TO THE POSTERIOR PART OF THE INSULA.

b, Destructive focus which cuts off all the communications of the two temporal convolutions (mn); the respective fibres curve round the temporo-insular angle (ti), pass through the external capsule (ce), and reach the frontal operculum, turning round the fronto-insular angle (fi).

Lastly, I mention here the *temporo-frontal bundle*. This bundle arises from the first temporal convolution, curves round the temporo-insular sulcus, passes below the insula into the outermost capsule, and perhaps also into the external, reaches the fronto-insular angle, and becomes projected into the third frontal convolution. It is the bundle by means of which the first temporal convolution exercises its regulative influence on the centre of Broca, and a lesion of which produces the so-called paraphasia (Fig. 34). Through the medium of these better-known bundles of associative fibres, and many others either less well known or less important, numerous and strict relations are secured between distant and neighbouring regions

of the cerebral mantle—relations which are the essential conditions of harmonious action on the part of the various regions of the cortex, possessing as they do such different functions, and whose products, associated, fused, and combined with one another, concur in the formation and development of the personality and the reaction of the latter upon the environment.

MINUTE ANATOMY OF THE CEREBRAL CORTEX

Cerebral physiology and positive psychology, which hitherto were without any certain and decided direction, have now taken their trend from the doctrine of the localization of the functions of the cerebral cortex—a doctrine whose soundness is indisputable, and which in its turn embodies the results of unexpected advances in morphology. Each of these departments of science has added its quota to our notions of the seat of the elementary as well as the more complex psychic phenomena through which the human mind manifests itself, in the infinite directions impressed on it by time and circumstances. Not unimportant, too, is the assistance rendered by histology, which promises to secure for them, through the magnificent successes of the microscope, a wider field, productive of new and definite facts, which may give to psychological doctrines a sound foundation, and not one that is merely subjective.

The new methods of staining, furnishing as they do fairly precise notions of the form of the nerve cell, its prolongations, and its relations with other cells, both neighbouring and distant, as well as the intimate structure of the cell and its processes, have brought to psychology the means of formulating hypotheses concerning the function of the nerve elements, either as isolated members or interposed in the inextricable network permeating the whole organism, and forming the nerve centres in an especial manner; and they have furnished indisputable proof that Nature, from the simplest to the highest manifestations of her energies, follows always the same plan and the same laws, and that to that unavoidable law of the number, the complexity of organization, and the combinations and associations, among the others, even thought is strictly subservient.

As already mentioned, the cerebral cortex (and of it alone can we treat in this work) is composed of an interminable number* of cerebral units, of cells and their corresponding processes, presenting diverse forms and dispositions, thus permitting it to be distinguished into layers, each formed mainly of nerve elements of a determined form. From the fact, however, that these layers are neither distinguished with precision nor constituted exclusively of cells of the same form, much confusion has resulted concerning the exact number of layers composing the cerebral cortex. I shall here indicate the

* The results of the investigations of Hammarberg have been entirely confirmed by B. Thomson.

most important. Meynert distinguishes in the Rolandic zone five layers :

1. A layer of small, scattered nerve cells (called also granular or molecular layer).
2. A layer of small aggregated pyramidal cells.
3. A layer of large pyramidal cells.
4. A layer of small pyramidal cells.
5. A layer of fusiform cells.

The above five layers are brought to six by Bewan Lewis, Gowers, and Kölliker ; are reduced to four by Boll, Schwalbe, and Ramon y Cajal, and to three by Golgi.

The latter is certainly right when he says that Meynert's distinction of five layers is arbitrary, a precise demarcation being impossible, and the differences between the various zones occurring gradually. The three layers of Golgi would be :

1. A superficial layer, comprising the upper third of the cortex, and formed of small pyramidal cells, and a somewhat smaller number of polygonal and globular cells.
2. A second layer composed of pyramidal cells of both large and medium size, and occupying almost the middle third of the cortex.
3. A third deep layer formed of globular, polygonal, atypical, and especially of fusiform cells.

According to Cajal, the outermost or superficial layer is composed of tangential nerve fibres, to which he attaches a special importance, and of nerve cells, so that it may be regarded as an additional layer, called by him plexiform.

The disposition of the cells of the above-mentioned layers of the cortex, their diverse form, and their various relations, should suggest to our minds a different physiological value for each variety. This conception has embodied the spirit of the most modern histological investigations, of which I shall here make a rapid review. My object will be best attained by proceeding to give a synoptical description of each layer and its relations with the others.

The Plexiform, Molecular Zone, or Layer of Ramon y Cajal.—This layer is composed of a very large number of fibres intersecting in the most diverse manner, so as to give a reticulated appearance, with an abundance of neuroglial cells and a certain number of triangular or fusiform nerve cells. It is surmounted at the surface by tangential fibres discovered by Kölliker, and confirmed by Obersteiner, Edinger, Todt, Martinotti, Cajal, and others ; these fibres are of obscure origin, but very probably come from the nerve cells of this same layer. These cells, as mentioned, have various forms ; some are polygonal, in which case protoplasmic processes are given off from the angles of the cell body, some of these reaching the layer of small pyramidal cells. The nerve process arises either from the cell body or from the base of a protoplasmic process, is directed

towards the surface, after a horizontal or oblique course, and subdivides several times, giving rise to fibres which never descend into the white substance.

Others are fusiform, and give rise, from each pole, to a stout trunk, which runs for some distance in a straight line, then gives off ascending branches towards the surface, where they break up into other very long filaments having all the appearance of nerve fibres ramifying in the territory of the molecular layer, and coming into relation with the protoplasmic ramifications of the pyramidal cells of the underlying layers. These cells would have no protoplasmic processes, but only nerve processes.

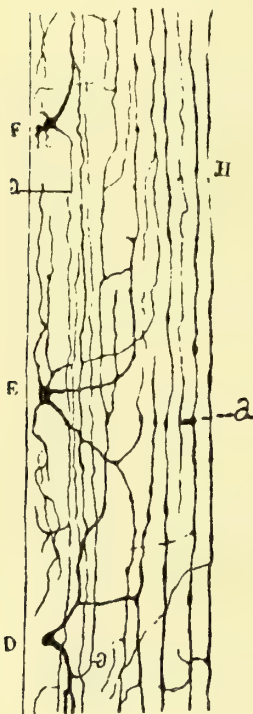


FIG. 35.

EDF, Polymorphous cells of the molecular layer; H, horizontal or tangential fibres coming from cells of this zone at a great distance; a, minute ramifications having all the appearances of axis cylinders.

Others, again, are triangular or stellate. These, as their name indicates, present three or more angles, from each of which one branch is given off, to run in a horizontal direction for a longer or shorter distance. These branches supply fine collaterals to, and ramify in, the molecular zone, transforming themselves into filaments having the appearance of axis cylinders.

It is in this more or less dense network of ramified nerve processes, coming from the special cells of this layer, that there terminate the ascending ramifications of the pyramidal cells of the underlying layers.

According to Cajal, the special corpuscles of this layer may represent association cells of enormous importance, establishing dynamic relations with the ramifications of the pyramidal cells of the neighbouring convolutions.

Layer of the Small and the Large Pyramidal Cells.—Some authorities would regard this as consisting of two layers distinguished only by the different sizes of the cells composing them, the more superficial being smaller, and becoming gradually larger towards the deeper

layer, so as to constitute the third layer of these authorities, which consists almost exclusively of large pyramidal cells. These cells, both small and large, have in particular a pyramidal form, with the apex above and continued into the pyramidal protoplasmic trunk, which pursues its course upwards, giving off collaterals at varying distances; these, in their turn, ramify and end in a splendid basket-work or bouquet composed of terminal protoplasmic arborizations, lying free in the molecular layer.

Besides the principal protoplasmic trunk, other protoplasmic

prolongations are given off at different points of the cell body, at a right or acute angle, and these also dichotomize and terminate freely in different directions—some horizontally, others obliquely upwards or downwards (basal protoplasmic processes).

From the bases of these cells are given off the nerve processes—one only for each cell—proceeding in a downward direction, traversing all the layers of the cerebral cortex, and finally reaching the white substance. During its course it gives off some collaterals, which, as a rule, detach themselves at right angles, run for some distance in a horizontal or oblique direction, and terminate freely in two or three small branches, while the nerve prolongation, without losing its individuality (Golgi), becomes, in the ordinary course of affairs, a projection fibre, and proceeds towards its destination. The prin-



FIG. 36.—LARGE AND MEDIUM-SIZED PYRAMIDAL CELLS.

AB, Layer of the small and large pyramidal cells; a, giant pyramidal cell; b, medium pyramidal cell and descending axon; c, pyramidal cell with descending axon bifurcated and ramified in the zone of the giant cells; a, axon; d, protoplasmic trunk.

incipal collaterals of the axis-cylinder processes of the small pyramidal cells most frequently ramify in the same cell layer, but some, according to Schäfer, turn upwards again in order to ramify in the molecular zone.

The last layer is composed of polymorphar cells—stellate, polygonal, fusiform—and some large and small pyramidal cells. The majority have no determined disposition as regards the protoplasmic expansion and the axis-cylinder process; on the contrary, the great expansion, so characteristic of the pyramidal cells, is here almost entirely absent, and there is found instead short, stout, protoplasmic processes ramifying and sending collaterals and arborizations in different directions. It is in this layer that we find cells with a short cylinder axis, dividing and subdividing in the gray matter itself, and losing their proper individuality (sensory corpuscles of Golgi); likewise a large number of cells with cylinder axis turning upwards,

and giving off some collaterals along its ascending course, finally terminating with arborizations either in the molecular layer or, more rarely, in the layer of the small pyramidal cells (Fig. 38).

The researches of Cajal, Hammarberg, and Schlapp have demonstrated notable differences in the structure of different functional provinces. While Hammarberg distinguishes the motor from the

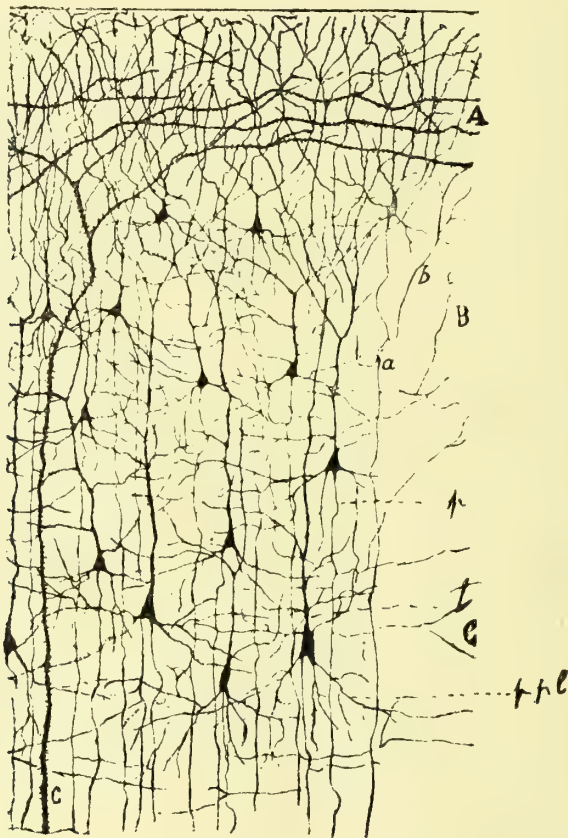


FIG. 37.

A, Plexiform zone; BC, zone of the small and medium pyramidal cells; a and p, descending axis-cylinder prolongations; b, recurrent collateral; c, dendrites of the giant pyramidal cells; t, caudal protoplasmic trunk; ppl, basal protoplasmic process.

sensory type, Schlapp and Cajal recognise a different structure in the cortical areas of projection and association (?).

The olfactory area, for example, is recognised by the great density of the molecular zone, and the absence of small pyramidal cells, in place of which we find stout triangular cells or fusiform corpuscles (Colleja, Kölliker).

The cortex of the zone of association (and also that of the motor and acoustic zones) would be composed of six layers: (1) Plexiform; (2) small pyramidal cells; (3) large pyramidal cells; (4) granules, or small pyramidal cells, mixed with small stellate cells; (5) deep,

medium, and large pyramidal cells ; (6) fusiform and polymorphous corpuscles. The disposition of these layers, and the number and form of the cells composing them, vary in the different physiological zones ; thus, *e.g.*, Schlapp recognises eight layers in his visual type, and Cajal, in a very recent work, enumerates the layers of the cortex of the calcarine fissure as high as nine.

This is not the place to enter into great detail concerning the structure of the different cortical areas, all the more that such notions have not yet received confirmation, as Hitzig opportunely made evident at the recent International Congress at Paris, in talking of the doctrine of Flechsig. I reproduce, after Cajal, however, the figure of a section of the visual cortex of an adult man (Fig. 41).

The nerve processes of all these varieties of cells help to form the mass of white substance of the cerebral hemisphere, composed of fibres of diverse origin and direction. Of these, we distinguish :

1. *Projection fibres*, which reach the optic thalamus, the lenticular nucleus, the cerebral peduncle, and the pons ; some of these, without becoming interrupted, go to form the pyramidal bundle, and come partly from the large pyramidal cells (Monakow) and partly from the small pyramidal cells (Cajal).

2. *Association fibres*, which establish communications between cells at more or less distant points of the same hemisphere. They are supplied to a great extent by the fusiform (Figs. 39 and 40) and polymorphous cells of the lower layer of the cortex, the nerve processes of which, after detaching collaterals, terminate either in a bifurcation or a T-shaped division (Fig. 40, *g*). Since the two branches of the bifurcation frequently take a different or an opposite direction, it is clear how distant cells and cell groups can be brought into relation with one another. In addition, we must take into consideration the collaterals given off at various distances along their course, some of them terminating in the white substance, or entering into relations with the protoplasmic processes descending into the white substance.

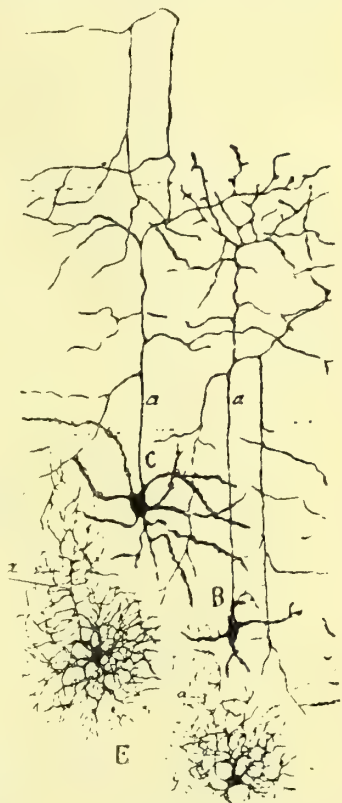


FIG. 38.

BCE, Cells frequently found in the fourth layer of the visual zone, with ascending axon *a*, which is distributed either to the zone of the large pyramidal cells or to the zone of the medium cells, or else loses its proper individuality (sensory cell of Golgi, E).

3. *Callosal Fibres*.—These are formed either by nerve processes of the cells or by their collaterals, and they bring into relation with one another (though the mode of termination of the said fibres is yet very obscure) both symmetrical and asymmetrical regions of the two hemispheres. Still other fibres exist, but enough has been said in this brief review to give one an idea of the complicated mechanism of the cerebral functions, based upon the knowledge which has accrued so largely from the method of Golgi.

Another field of inquiry was opened by the same eminent histologist concerning the manner of termination of all the ramifications of the nerve prolongations, as well as the protoplasmic processes. In other words, in what manner are relations established between different nerve elements and between these and the neuroglia elements?

Two doctrines contend for the supremacy. The first, that of

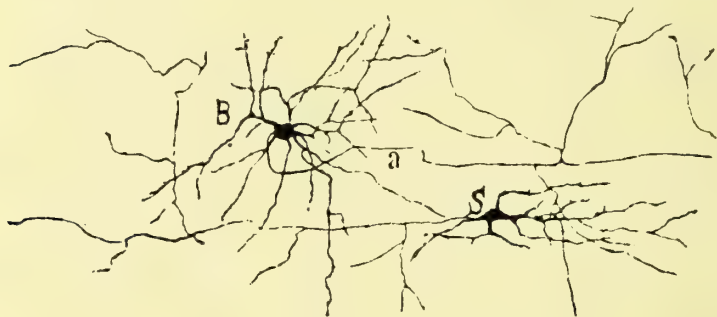


FIG. 39.

BS, Cells with horizontal axon (a), found frequently in the zone of the medium and small pyramids of the visual cortex.

Gerlach and Golgi, after a period of almost complete abandonment, allies itself with the more recent doctrine of Apaty, and moulds itself upon the fundamental conception of the anastomosis of the processes of the nerve cells—transmission of the nerve wave by *continuity*. The second doctrine, favoured by Cajal, V. Gehuchten, Lenhossek, and many others, considers the cell, with its processes, as an embryological, anatomical, and functional unit—the so-called neurone of Waldeyer, endowed with a certain power of contractility or amœboidism, its processes not forming any anastomosis with those of other neurones, but transmitting the nerve wave in a certain direction through *contiguity* or contact. This doctrine conforms to a conception of His, who, not convinced of the continuity of the nervous reticulum, promulgated the theory of the existence of a nervous filter or diffuse nervous substance capable of transmitting the nerve current, to which he gives the name of *neuropile*. The important bearing of such doctrines upon physiology and psychology justifies us in entering into fuller details.

According to Gerlach, the reticulum would be formed of protoplasmic processes, while the axis-cylinder processes would remain independent. Golgi, as a consequence of the discovery of his well-known method with the nitrate of silver, overturned the conception of Gerlach in the sense that the nervous reticulum (the existence of which he confirmed, and has remained the most convinced supporter) is not composed of protoplasmic processes, but of axis-cylinder processes and their collaterals. The protoplasmic processes, according to Golgi, do not take any part in the conduction of the nerve current. They are organs of nutrition for the nerve cell, and

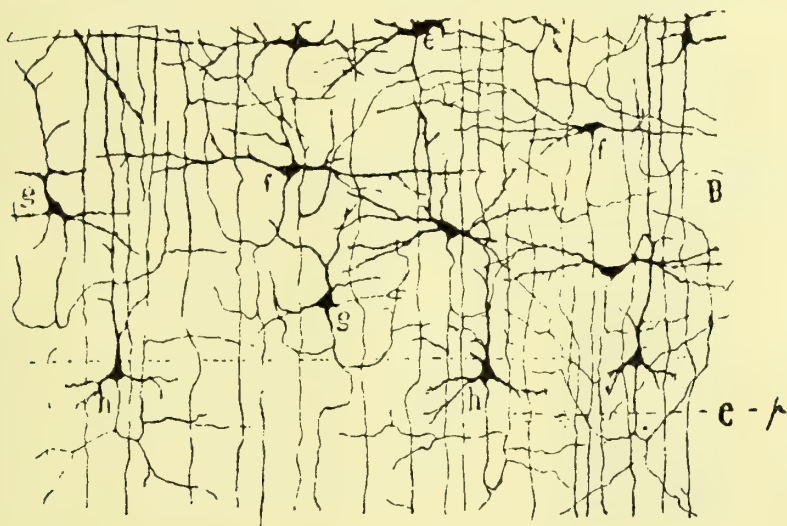


FIG. 40.

B, Layer of the stellate and fusiform cells; C, layer of the pyramidal cells with arched axon; g, triangular cells with stout collaterals—the axis cylinder of one of them divides almost like a T; e, fusiform element with descending axon giving off many collaterals in opposite directions; ff, fusiform horizontal cells; hh, pyramidal cells with arched or recurrent axon; p, ascending axis-cylinder prolongation of a pyramidal cell.

therefore terminate freely, most frequently in contact with the capillary vessels.

We come now to the doctrine of the neurone. The neurone, according to the supporters of this doctrine, is an anatomical and physiological unit, and is composed of three parts—the cell body, the axis-cylinder process, almost always single, and the protoplasmic processes in variable number. The neurones come into relation or articulation with one another by contact; every process or collateral ends in arborizations which establish relations with those of other neurones, the arborizations of the protoplasmic processes of one neurone always with those of the axis-cylinder processes of another; the wave is transmitted from the axis-cylinder to the protoplasmic processes. The cell is the source of the energy, which is cellulifugal

in the axis-cylinder and cellulipetal in the protoplasmic processes (laws of dynamic polarization of V. Gehuchten). Thus, for example,



FIG. 41.—CORTEX OF THE CALCARINE FISSURE OF AN ADULT BRAIN.

1, Plexiform zone; 2, zone of the small pyramidal cells; 3, zone of the medium pyramidal cells; 4, zone of the large stellate cells; 5, zone of the small stellate cells; 6, zone of the small pyramids with ascending axon; 7, zone of the giant pyramidal cells; 8, zone of the pyramidal cells with ascending arched axon; 9, fusiform cells.

in the cerebral cortex the dendritic expansion of the pyramidal cells receives the nerve waves from the arborizations of the ascending axis-cylinder process of the sensory cells, and transmits them to the body of the pyramidal cell, which in its turn transmits them, through its axis cylinder, to the protoplasmic arborizations of the cells of the anterior cornua of the spinal cord; thus, the neurones are distinguished into sensory and motor. The one set receives the impulses from without, and transforms them into nervous or psychic waves, and then transmits them to the motor neurones, determining reflexes from the simplest to the most complex. On the other hand, amœboidism, applied to the nervous system of the higher animals, or, more exactly, to the axis-cylinder and protoplasmic processes (the expansion and retraction of which serve to establish and break the contacts between the various neurones), taken along with the existence of associative cells which, by means of axis-cylinder and dendritic processes of great length, exchange their products with distant neurones, was capable of giving us the key to the comprehension of a number of cerebral phenomena—*e.g.*, the reawakening of diverse images when only one group of neurones is put in vibration, all the phenomena of the association of ideas, of memory, of abstract thought, of actions, and so on, which led Brissaud to observe, 'Should we be dealing with an insufficient innervation, or an excessive innervation, the amœboid neurone gives the key to all.'

According to this doctrine, the active part of the neurone is the cell with its dendrites, while the axis-cylinder process has no other task than the conduction of the nerve current. The vibration

commences in the dendrites, is directed to the cell body, and thence passes to the nerve fibre. The dendrites would play a very important part in the nutrition of the cell, because they also lie bathed in the same lymphatic fluid as the cell body, which, on the other hand, exercises a trophic influence on the axis-cylinder process; the latter, consequently, degenerates if separated from the cell body.

Viewed in the light of this doctrine, the importance of the dendrite is carried to the highest degree, because its substance, alive and motile, would react with amœboid movements under the influence of external stimuli. It would likewise have a tendency to produce new buds and new protoplasmic ramifications under new conditions of existence. In like manner, under the influence of stimuli, the gemmulæ of the dendrite would increase in number, and the functional and nutritive surface of the cell would accordingly be augmented.

While, however, the doctrine of the neurone was finding sympathy in the more important scientific centres, and psychologists and neuropathologists were taking it up, as offering a probable anatomical basis to the interpretation of psychic phenomena, Apaty, Paladino, Bethe, and Held entered into the field to check its victorious march, and to extinguish the enthusiasm of its fervid supporters, by adducing the result of new investigations, and restoring life, under another form, to the almost vanquished doctrine of the nervous reticulum of Golgi.

Paladino, using his method of staining by the iodide of palladium, has observed relations of continuity—true anastomosis—between the nerve processes of neighbouring and distant cells. These results were confirmed by the researches of Fragnito and Capobianco. Of great importance are the observations of Apaty and Bethe, who, save for unimportant differences in their results, would appear to have demonstrated that the nervous system is composed of a continuous, inextricable network of nerve fibrillæ, extracellular and intracellular, without any interruption. The nerve cell, with its protoplasmic processes, is interposed in the course of the nerve fibres, like the electric piles in the course of an electric network. The axis-cylinder processes are composed of neuro-fibrillæ (Apaty), and these, in their turn, of primitive fibrillæ, constituting a continuous reticulum, either intercellular, pericellular, or intracellular. There is thus no interruption between sensory fibres and motor fibres. In the epithelial cells of the organs of sense a fine nervous reticulum is found, formed of primitive fibrillæ, which collect the waves from external stimuli. These primitive fibrillæ would constitute, outside the epithelial cells, the neuro-fibrillæ, which, in their turn, would form the axis cylinder of a ganglionic nerve cell. Within the cell body the axis cylinder resolves itself into the neuro-fibrillæ, and these form the endocellular reticulum, and issue from the cell body again in the form of an axis cylinder. If amongst the neuro-fibrillæ there

is one stouter than the others, this is a motor fibre, and so would only represent the continuation of the sensory neuro-fibrillæ.

A still more important fact, however, is that the neuro-fibrillæ forming an axis cylinder do not always penetrate into the cell, but some, after arriving at the ganglion, resolve themselves into primitive or elementary fibrillæ, and form a thick pericellular and intercellular network. The nerve cells would only be bodies interposed along the course of the nerve fibrils, like the heart in the vascular system, which forms one continuous whole. The fact that the nerve fibrils and their networks can exist outside the cell would greatly magnify their value as compared with the diminished importance of the cell.

Bethe agrees with Apaty on the independence of the neuro-fibrillæ as regards the nerve cell. According to him also, the cell is only interposed in the course of the nerve fibres. These, whether sensory or motor, converge towards a central point situated in the middle of the nerve ganglion. This point to which the fibrils converge is called by him *neuropile* (a kind of *carrefour*, as the French would say), and is extracellular, so much so that whilst the peripheral nerve cells of the ganglion may be destroyed, yet the motor reflex is preserved. The motor fibre can arise from the intercellular network outside the cell. Bethe is much more reserved, however, on the question of the anastomotic reticulum of the nerve processes and the contiguity of their terminations.

The independence of the nerve fibre as regards the cell (without mentioning the protoplasmic processes, which, according to the doctrine of Apaty and Bethe, lose the character and value assigned to them by the doctrine of the neurone) is also supported by an embryological fact of great importance—namely, the formation of the axis cylinder independently of that of the nerve cell. Here we have to deal with autochthonous formations by metamorphosis of special embryological cells, giving rise to the axis cylinder. Another blow is also given to the doctrine of the neurone by the researches of Fragnito, assistant at my clinique, who discovered this other fact, that the nerve cell itself is not an embryological unit, but results from the fusion, by a particular process, of several neuroblasts. These results, highly important as they are, have recently been confirmed also, save for unimportant differences, by Capobianco. Hence, the doctrine of Golgi, under another guise, becomes again victorious. Golgi's method does not succeed in revealing the intimate structure of the cell in all its particulars. This is shown more clearly, however, by the methods of staining called after Nissl, who introduced them. After Nissl, Lenhossek, Held, Flemming, Heinke, Paladino, Cajal, Van Gehuchten, Marinesco, Lugaro, Colucci, Levi, and others, have contributed to give us a somewhat precise and uniform description of the nerve cell, both in the normal state and under the influence of various pathogenic agents.

The protoplasm of the nerve cells is composed of two parts—the chromophilic, or colourable portion, and the achromatic part. The achromatic part of the cell protoplasm consists, in its turn, of two fundamental substances, one organized—the protoplasmic network (Van Gehuchten)—and one unorganized, filling up the meshes of the network. The trabeculæ and nodal points of the meshes, and more particularly those at the periphery of the nerve element, are encrusted with a substance (disposed as bodies of diverse form and size) which takes on the stain of the basic aniline dyes, and forms the so-called chromatic or stainable portion of the nerve cell. These are the so-called Nissl bodies.

The unstainable portion possesses the greater biological importance, especially if we take into account the fact that the fibrillæ forming the nerve prolongation and the protoplasmic processes take origin from it. Held, Heinke, Flemming, Cajal, Marinesco, Lugaro, and others have shown that in the cell of the spinal ganglion the single nerve process arises from a part of the nerve element, usually central, where chromatophilic bodies are not always found, called by Flemming the *polar cone*, and having, according to the majority of observers, a distinctly fibrillar structure. The fibres of the cone are prolonged into the fibres of the axon, and would appear to take origin from the trabeculæ of the reticulated substance. The axis-cylinder process, then, is composed of fibrils (neuro-fibrillæ of Apaty) arising from those forming the endocellular reticulum.

What has been observed in the case of the cells of the spinal ganglia holds good also for the motor cell, though here the matter is more difficult of demonstration. No great stress need be laid on the difficulty raised, that the nerve process sometimes arises from a protoplasmic process; on the contrary, this argument may be turned the other way when it is considered that the fibrillar structure of the dendrites, as well as of the axon, can itself explain the apparent anomaly, on the ground that the course of the fibres composing each is different.

The fibrils in the cytoplasm sometimes assume a concentric disposition around the nucleus or in parts removed from it, and while in some instances there is no exchange of anastomosis, in other cases, and in some animals in particular, an exchange of anastomosis between the fibrillæ may be observed.

The colourable portion is represented, in addition to the incrustations on the trabeculæ, by little blocks having a definite or irregular contour, an elongated, ellipsoid, oval, or irregular form, and sometimes a granular aspect, according to different elements and in different animals. These little blocks often converge in the principal dendrite (protoplasmic process), becoming thinner and more elongated the farther from the cell body (Fig. 44); they are found both large and small, and in some animals are exceedingly small—almost granular, in fact.

In some instances, however, they are found in greater concentration around the nucleus.

The nucleus consists of a membrane, a reticulum (protoplasmic reticulum) which is stained with Biondi's fluid, of acidophil particles (basic chromatin, or nuclei of Lenhossek), and of one and sometimes more nucleoli (two or three), consisting of a central acidophil part and two to three basophil particles, which take on a deep azure with methyl green and are disposed near the periphery.

In the dendrites the chromophilic particles become, as already mentioned, longer, thinner, and rarer; they appear to be bound to one another by short undulating fibres, but in proportion as the particles disappear the fibrils appear straighter, thinner, and more parallel to the axis of the dendrite. These fibrils are continuous with those of the peripheral part of the cell.

The chromophilic particles do not exist in the period of embryonic formation of the nerve cell. Before the third month the most that

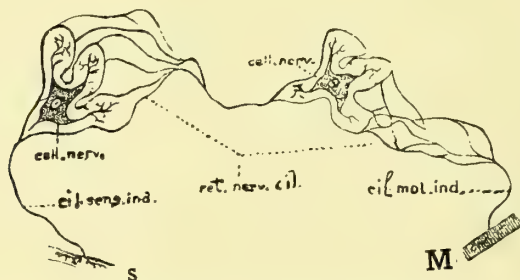


FIG. 42.—SCHEME OF THE NERVOUS RETICULUM, CONTINUOUS FROM S—SENSORY SURFACE—TO M, MUSCLE.

is found is a certain quantity of chromophilic substance dissolved in the cell body. It is only from the third month onwards, according to Biewliet, from the fourth, according to Dell' Isola, that it is found in the form of solid particles and granules. At first these are found only at the periphery of the nerve cell; later, with the increase of the cell protoplasm, the particles advance towards the centre, and draw nearer to the nucleus. Fragnito offers as an explanation of this fact the doctrine that the increase of the cell is due to the neuroblasts disposed at its periphery augmenting the cell protoplasm. According to this theory, the appearance of the chromophilic particles coincides with the transformation of the embryonal cells, the chromatic reticula of these condensing to form the chromatic particles of the adult cell; and it is natural that the first layer—the external—should become more internal in proportion as the new elements are superimposed on the periphery of the cell and transformed into its protoplasm.

The chromophilic substance is less stable than the fibrillar substance. It seems certain, from the investigations of Hodge,

Mann, Demoor, and Pergens, that activity of the nerve cell is accompanied by augmentation of the volume of its protoplasm and diminu-

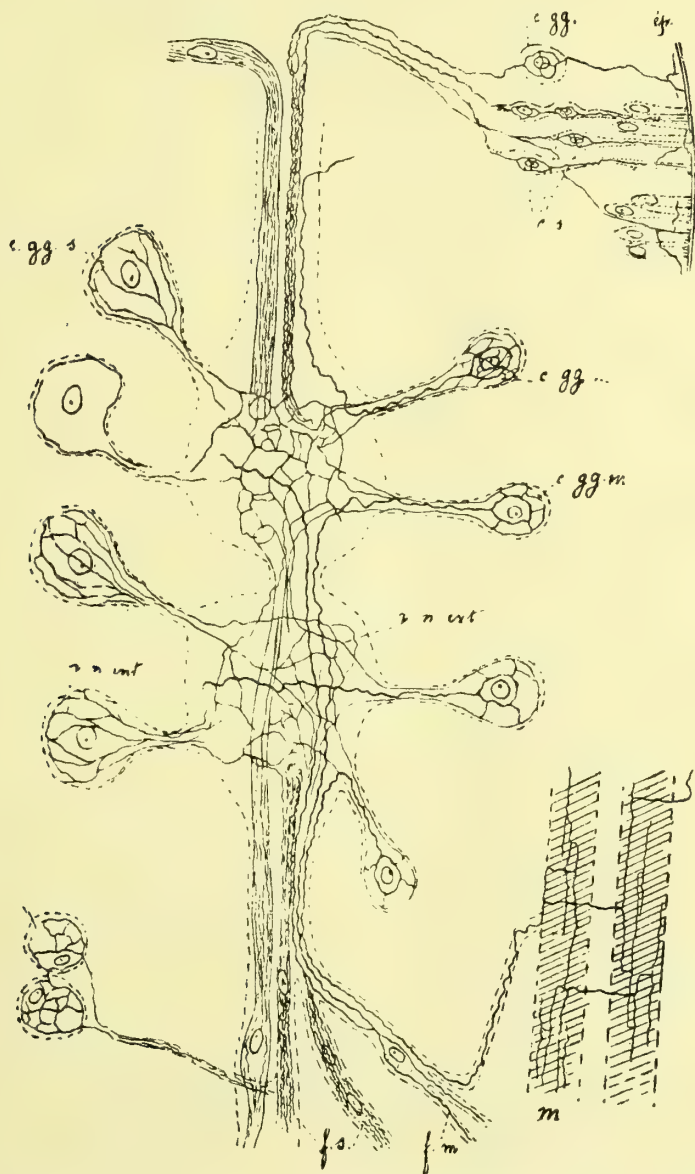


FIG. 43.—SCHEME OF THE TRACT AND THE CONNECTIONS OF THE NEURO-FIBRILS IN THE LEECH. (AFTER APATY.)

fs, Sensory fibrillæ; fm, motor fibrillæ; c. gg. s, sensory cells; c. gg. m, motor cells; r. n. ext., diffuse nervous reticulum of Apaty; r. n. int., intracellular nervous reticulum; c. gg, ganglionic cell.

tion of its chromophilic substance. This fact agrees with another previously observed by Nissl, that nerve cells belonging to the same morphological type present great differences in the amount of their

chromophilic substance. The same author proposes the terms picnomorphic, apicnomorphic, and parapicnomorphic states for the three degrees of colorability of the cells, these corresponding to so many momentary functional states. Following the same line of investigation as Nissl, and pursuing the same method upwards instead of downwards, others, such as Lambert, Mann, Lugaro, and Hodge, have confirmed the fact that more or less intense and prolonged excitation of a nerve, or of the ganglion itself, induces modifications in the anatomical state of the respective nerve cells. The general conclusion drawn by the above-mentioned authorities, however, is severely criticised by Van Gehuchten, who disputes the theory that

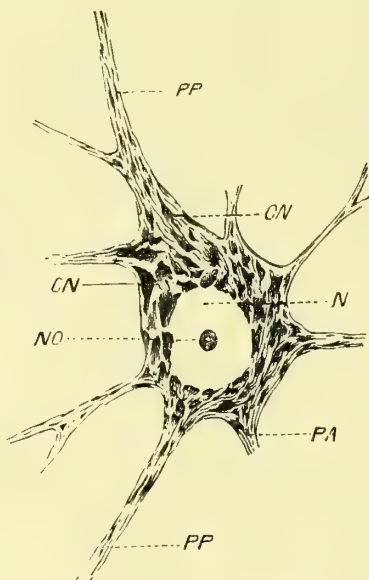


FIG. 44.—NERVE CELL PREPARED BY NISSL'S METHOD (WHICH DOES NOT DISCLOSE THE NUCLEAR RETICULUM).

PP, Protoplasmic prolongations ; PA, axis-cylinder prolongation ; N, nucleus ; NO, nucleolus ; CN, Nissl bodies.

artificial excitation of a cell by means of the faradic current can identify itself with the state of physiological activity of the same. That there is a strong probability in the conception of Nissl must, however, be acknowledged, as it is very likely that the chromophilic substance is a reserve material intended for the nutrition of the nerve cell.

Meanwhile a large number of observations have set beyond all doubt the fact that both in states of fatigue consequent upon excessive cell action (Stefanovska) and by the action of pathogenic agents—infections, autointoxications, poisonings, powerful electric shocks (Corrado), such as those of lightning—a change in the cell structure is induced, which in the first stage consists of a diminution or disappearance of the Nissl bodies (chromatolysis, or, better,

cytolysis), and in the second stage in the disappearance also of the reticulum of endocellular fibrillæ (cytoclasis, V. Gieson). This is extremely important from the fact that cytolysis is reparable in a longer or shorter time, because the Nissl bodies regenerate, while cytoclasis is not recoverable, or, in other words, is not followed by what Van Gieson calls cytothesis. We shall see further into this matter, however, when dealing with the pathological anatomy of the mental affections.

In recent times we have had affirmation of the existence of fine canaliculi in the nerve cell, irrigating its protoplasm, and, according to the observations of Colucci, communicating with a perinuclear space. Holmgreen, on the other hand, would have it that such canaliculi communicate with the extracellular lymphatic channels. It is probable, though not certain, that the internal reticular apparatus of the cell described by Golgi coincides with the canaliculi described by Holmgreen and Bethe. We have still much to learn concerning the relations of the nerve cells with the lymphatics, a question which I believe is entangled with that of the special lymphatic channels indicated in the brain by D'Abundo.

NEUROGLIA.—The elements composing the neuroglia are the ependymal cells and the arachnoid cells, the processes of the latter constituting the neuroglia fibrils. The glia cells are provided with a body, which is all the more distinct the younger the animal and the further we descend in the scale of the vertebrates.

The ependymal cells line the cavity of the cerebro-spinal axis, and originate from the epithelial cells, which, conjointly with the germinal cells, constitute the whole thickness of the wall of the primitive neural canal. The arachnoid cells are found in the gray as well as in the white substance of the nerve centres. Both kinds are provided with processes.

The glia cells are elements in the course of evolution, and when this is completed the nucleus disappears or falls away, and then the cell body seems like a point of intersection of fibrils.

The evolution of the glia cells would explain the presence of so many nuclei in the neuroglia, besides allowing us partly to understand the finding of Ranvier, Weigert, and others, who dispute the individuality of the complete neuroglia cell, and maintain that the fibres are independent of the cells.

The processes belonging to the neuroglia cells differ in length and are variously ramified; one in particular is much thicker than the others. Some maintain that the neuroglia processes cross one another without anastomosis, but it is much more probable that some of them unite with the processes of neighbouring cells, and others with those of more distant cells. Thus we have a disposition with proximal and distant relations, a fact which, while opposed to all opinions previously advanced, yet in part affords an explanation

of them. For the most part, the stouter process serves for the proximal relation between two glia cells.

From the extensive application of the chrome-silver method, we may reasonably admit the termination of the processes or neuroglia fibrils on the adventitia of the bloodvessels. After treatment, in the first instance, by the iodide of palladium (Paladino), and then by differential staining, it is possible to demonstrate that the neuroglia processes are continuous also with the pia mater, and take up absolutely new relations with the cells and the nerve fibres—that is to say, (*a*) the neuroglia becomes less plentiful around the nerve cells, forming a pericellular reticulum (neuroglia network), with narrow meshes and small corpuscles inserted on its nodal points. It is very probable that this superficial network may be continued into the interior of the cell body (Paladino); (*b*) the neuroglia penetrates the myelin sheath of the nerve fibres, and constitutes their skeleton (myelinic neuroglia of the medulla of the nerve fibres). The nodes of Ranvier and notches of Lantermann, etc., would be part of this skeleton.

These relations are particularly evident in some vertebrates, but are quite distinct in all, including man and mammals, in both normal and pathological conditions.

These new relations between the neuroglia and the nerve elements, confirmed by Colucci as regards the retina, and in the nerve centres of the vertebrate series by Capobianco and Fragnito, constitute a discovery of the highest importance in the architecture of the cerebro-spinal axis. According to Prinke, again, two orders of neuroglia elements would exist—first, those put in evidence by the chrome-silver method (the spider cells, with their proper protoplasmic processes, terminating freely or otherwise); and, second, neuroglia fibres independent of the cells, and morphologically and chemically different from the cell bodies: these would be formed certainly from the protoplasm of the neuroglia cells, from which, however, they would be set free in the course of development.

As regards the function of the neuroglia, they are now few who maintain that it must serve merely as a supporting tissue. Golgi holds that the processes of the neuroglia cells come into relation with the processes of the nerve cell, and serve for the nutrition of the latter.

Others affirm, somewhat hypothetically, that the neuroglia processes are interposed between the nerve fibres in order to isolate them, and thus impede functional contacts (Cajal, Sala). The fact that the neuroglia cells are found in great number around the vessels and enveloping the nerve centres has given some the idea (Andriezen) that one of the functions of the neuroglia cells is that of protecting the nerve cells against sudden dilatation of the vessels, and also against vibrations due to shocks from without (Weigert).

According to Cajal, the nerve cell arborizations are not endowed

with amoeboid movements for the establishment or interruption of contacts. On the contrary, it would be the contraction or expansion of the neuroglia elements that would permit or impede the contacts between the nerve elements; acting like pseudopodia, they would constrict or dilate the capillaries, and finally serve as regulators of the circulation in the gray matter, in both phases of repose and activity.

The same authority regards the form and mechanism of the neuroglia cells of the gray substance as characteristic. Sometimes their processes are short and thick, sometimes long and besprinkled with secondary and tertiary offshoots. According to this histologist, the cells with short processes would represent a state of activity, during which they remain free from contacts with the nerve processes. Those with long and branching processes would be in a state of relaxation; they would be interposed between the protoplasmic processes and the axis cylinders of the nerve cells, and would impede their contacts. This conjecture lacks any basis of proof whatsoever, and has a merely historical value.

On the other hand, Marinesco would contend that the neuroglia has a tendency to encroach upon the anatomical field of the nerve cell. This power would be neutralized by a substance secreted by the young nerve cell, and having the property of impeding the invasion and phagocytic tendency of the nuclei of the neuroglia. Histochemical alterations of the nerve cell would deprive it of the power of guarding itself against the invading property of the neuroglia, and in this we would find an explanation of the increase of nuclei in senile decay and other pathological states.

Orr and Cowen dispute this hypothesis, refusing to admit the phagocytic action either of the nuclei of the neuroglia or of the leucocytes. After accurate observations, they are able to assert that these elements are found in a plane different from that of the nerve cells. They add, what we have held for a long time, that the proliferation of the neuroglia is secondary to the degeneration of the nerve fibres, as the result of the irritation produced by the toxins arising from the degeneration of the nerve elements themselves.

CHAPTER II

PHYSIOLOGY OF THE CEREBRAL MANTLE

WE have studied in the preceding chapter the cortical stations of the centripetal paths for common sensation and the different special senses, and those of the centrifugal paths belonging to the motor apparatus. I believe, however, it is not only advantageous, but necessary to some extent, to turn our attention upon the signification which the cortical sensory centre and the motor centre ought to have for us. With this end in view, we can take, for example, sight, as being that mechanism which has been best studied and of which the analysis is most easily accomplished.

Sight, as we have already mentioned, is present in some primordial representatives of animal life, such as the rhizopod, whose eye is but a spot composed of epithelial cells which fix the luminous rays ; it is found in insects which do not yet possess a cerebral mantle, but specialized cell aggregations (optic ganglia) ; also in fish, in some of which, as stated in the introduction, there exists certainly a cerebral mantle, but in a rudimentary condition. In the higher mammals and in man, besides the optic ganglia, represented by the corpora quadrigemina, we have the optic thalami and other centres differentiated in the cerebral mantle now enormously developed. Such successive formation of new organs destined for the same function must lead us to associate the gradual development of that function with the appearance of numerous new anatomical components, the introduction of which may add a further contribution towards the attainment of the object ultimately to be reached.

One can have a simple luminous impression with no other knowledge of the illuminated object save in so far—and this only confusedly—as regards its relation to space. Of a certainty one cannot deny to this phenomenon the character of sensation—incomplete and rudimentary, it is true, because there are wanting the various qualities and attributes through the medium of which one can form an idea of the object in question, and bring into play the judgments of analogy, similarity, dissimilarity, etc., which tell us, not only the optic quality of the object, but also its special relations, such as its form, size, and position with respect to others. These latter attri-

butes must be furnished us by anatomical components different from, but naturally associated with, those destined to receive the luminous impression, which must be quite as distinct in the anatomical aspect as in the physiological. Indeed, we judge of the size and form of an object by the fact that its image on the macula lutea becomes displaced through the movements of the ocular bulb. Such movements, as a general rule, give rise to images of muscular sense (of movements completed) which are closely associated with those produced by the zone of projection of the retina upon the cortex; and both are necessary that we may have the precise image of the object which, in my opinion, results from the physiological fusion of distinct products, furnished by two elementary components—the retino-cortical and the kinæsthetic. The latter (the components of the visual image which refer to the form and volume of the object) is furnished by the centripetal currents which proceed from the external muscles concerned in the movements of the bulb in every direction, and from the muscles of accommodation.

Hitzig, Ferrier, Luciani and Tamburini, Bianchi, Bechterew, Munk, and as many others, found in the dog, as well as in the monkey, cortical areas (the second external convolution of the dog, the angular gyrus, and the anterior part of the occipital operculum of the monkey), excitation of which produces movements of conjugate deviation of the eyes in various meridians. Schäfer, experimenting even more methodically than the observers just mentioned, defined the cortical motor points of the eyes a little differently from Bechterew, with the result that we now know that special zones govern special movements in a determined meridian. Excitation of the superior zone of the occipital lobe produces downward movements of the eyes; that of the inferior part produces, on the other hand, upward movements. Stimulation of the intermediate zone gives rise to lateral movements of the ocular bulbs. The movements are more intense when the interhemispheric aspect of the occipital lobe is excited.

It serves no useful purpose to discuss here by what means the movements of the ocular bulbs are accomplished. The hypothesis of Ferrier, received favourably by Munk, Steiner, and Schäfer—that such movements may be necessary to arouse the visual images projected upon a given quarter of the visual field by the excitation of determined areas of the cortical visual zone—cannot be retained as proven. Without question, we must admit the existence of centrifugal fibres from the visual zone to the subcortical centres of the ocular movements (corpora quadrigemina). Munk, Steiner, and others hold this view.

This interpretation is not exempt from impartial criticism. The supposition that the ocular movements provoked by electric excitation may be *manifestly the consequence of vision* (Schäfer and Munk) is, after all, a *supposition* far from probable, and is contradicted by a fact of great importance—that the ocular movements of the infant

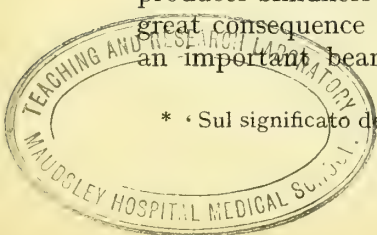
much precede the development of the cortical visual function (formation of images), which is held to be developed about the fifth month. Confining myself to a more ample consideration of the nature of the cortical motor centres, I have, hypothesis for hypothesis, no reason to change that which since 1880 ('On the Signification of Electrical Excitation of the Cortical Motor Zone'*) I have formulated concerning the real motor nature of the cortical centres, and I hold with Panillo and with Knies that the motor conductors of the occipital lobe concerned in the visual function enter into activity without being themselves necessarily excited by the visual images; in other words, that they are motor within the strict meaning of the word.

Further, in the frontal lobe there exist motor centres for the external and internal ocular muscles. One is found in the immediate vicinity of the centre for the muscles of the neck (conjugate movements of head and eyes). A little below and in front, at the middle of the prefrontal sulcus, a point is found, excitation of which always produces dilatation of the pupils. In the immediate vicinity of this small area is another, even more limited, excitation of which produces constantly slight elevation of the upper eyelid and dilatation of the pupil. Such areas I have always been able to define with precision in the frontal lobes of the monkey. Their relations are mostly crossed. The experiments of Bechterew have confirmed these by no means recent observations of mine. No one will think of admitting the existence, in that part of the cerebral mantle, of a centre for visual images which could be re-aroused by electric excitation, and that these would be able to produce ocular movements. On the contrary, everything leads to the belief that the frontal oculo-motor area may be developed by the positions assumed by the head and eyes in relation to attention. Hence, we may be induced to consider the points of excitation mentioned above as cortical oculo-motor areas, and so become convinced of the specialization of work, and of the association of its products. Anatomy and experiment, the one following closely on the heels of the other, have by proof arrived at a common ground, and have to a great extent solved the problem of the specific function of the diverse areas of the cerebral mantle.

Meanwhile, let us make a rapid review of the experimental facts which have been brought to light, especially by the researches of Hitzig, Munk, Monakow, Fürstner, Stenger, Loeb, Yeo, Luciani and Tamburini, Seppilli, Lannegrace, Schäfer, Beevor, Horsley, and myself.

In 1874 Hitzig affirmed that a lesion limited to the occipital lobe produces blindness of the opposite eye. This discovery has been of great consequence in both physiology and pathology, and has had an important bearing also on psychology. It has established a

* 'Sul significato della eccitazione elettrica della zona motrice corticale.'



scientific fact which neither the researches nor the quibblings of Goltz and his learned pupils have been able to discredit. It was already known, from the experiments made by Panizza and then by Gudden—even before the researches of Hitzig and the later ones of Munk and of Luciani—that some anatomical connections existed between the optic nerve and the occipital lobe. As regards the motor and visual areas, Hitzig and Ferrier were among the first to attempt to define their cortical whereabouts. Still, the experimenters mentioned are by no means in agreement as to the limits to be assigned to the visual area. Ferrier localized the centre of vision in the dog in the superior part of the second external convolution, and in the monkey in the angular gyrus. Munk is strongly of opinion that the centre for sight in the monkey is in the occipital lobe, with an extension to the parietal lobe. Goltz scarcely admits any functional difference between the posterior and anterior part of the cerebral hemisphere. Luciani and Tamburini contend that the area in question extends forwards beyond the limits assigned by Munk—a fact which was afterwards fully confirmed in dogs by my experiments.

In the case of the dog the centre of vision is not confined exclusively to either the second external convolution (especially the middle and posterior part) or to the occipital lobe, but is situated both in the occipital lobe and the whole of the external convolution. In this matter I find myself in agreement with Goltz, who, from the outset, has stoutly maintained that the visual zone in the cerebral cortex of the dog (as he understood it) is much more extensive than has been held by other experimenters. The brain of the dog lends itself badly to the dispute concerning the limits of the cortical visual zone, because electric excitation does not furnish the means of solving such a question, and mutilation does not give less uncertain results. When we consider for a moment that even the destruction of the frontal lobe—so little developed in the dog—produces almost the same visual disturbances as are produced after destruction of an occipital lobe, and that these last for many days, we see how difficult a matter it is to define the limits of the visual zone in the dog, because the differentiation of the individual areas is much less advanced than in the case of more highly-developed brains.

We know positively, however, that visual disturbances are observed on destroying the second external convolution even well in front—that is, that part which is immediately below the sigmoid gyrus. The visual disturbances which result from the mutilation of this part of the cortex are often very grave, and persist for a long time, just as when a part of the occipital lobe is removed. Further, lesions of the third external convolution, besides those of the frontal lobe, produce marked visual disturbances.

In the monkey, on the contrary, the visual area is more readily defined. Munk places it in the occipital lobe, but from the experi-

ments of Ferrier, in association with those of Yeo, of Luciani, and of Schäfer, it seemed demonstrated that the cortical visual centre, in the monkey, might be not only in the occipital lobe, but also in the angular gyrus. It was my belief that this ought to have held good in man also, because a series of observations upon some visual disturbances, with which we shall concern ourselves later on, showed that the inferior *parietal lobe*, especially that part of it which goes under the name of *angular gyrus*, might have been considered as the cortical visual centre with as much right as the *occipital lobe*; but now, as far as this question has regard to man and the monkey, much doubt has been thrown upon the value of the visual function of the cortex of the external aspects of the occipital and inferior parietal lobes, the question being whether the visual disturbances observed ought to be attributed to the lesion of the cortex or to lesion of the underlying optic radiations.

The latter theory was supported with a notable abundance of clinical and microscopic evidence by Henschen, to whom belongs the credit of the demonstration that all the visual disturbances produced by lesions of the external aspects of the occipital and inferior parietal lobes depend upon injury to the underlying optic radiations of Gratiolet, because the visual zone, according to Henschen, would include only that part of the internal aspect of the occipital lobe which forms the lips of the calcarine fissure (*vide* Chapter I.). If, however, the observations of Henschen, confirmed in other ways by Monakow and by Dejerine, have to all appearance settled the question of the organic visual disturbances (hemipopia), there remain to be discussed the other questions—in the first place, whether the external aspects of the occipital and the inferior parietal lobes are to be considered as belonging to the visual zone, and fulfilling higher visual functions, such as the formation and preservation of concrete visual images; or, secondly, whether indeed they fulfil functions other than visual. The first question is bound up with another: Is the visual sensory area only that indicated by Henschen, or that more extensive one of Brissaud and Dejerine; or, on the other hand, does it indeed extend as far as the parietal lobe? Again, in this latter case, is the function of the given zone equally distributed in such a manner that one part has the same functional value as it is wished to assign to the whole extension of it, or is it to be marked off into distinct areas whose sum total gives rise to the perfect product of the evolved visual function, which concerns itself in the formation and preservation of the complete visual images?

Few physiological problems present such difficulty as this for a solution. Goltz, having regard to the signification of the cortical visual zone, says that this area fulfils the functions of the so-called *mental vision*, which consists in the faculty of comprehending the nature and signification of the images which external objects reflect

upon the retina. The destruction of any part whatsoever of the visual area, which, according to Goltz, is very extensive, ought to produce such visual disturbances that the animal (by a restriction of the sense of colour and the sense of space) sees everything quite confusedly. But the doctrine of Goltz is met by obstacles not easily overcome, and, from a certain point of view, represents a return to the doctrine of Flourent. No advantage will be gained by reverting to it.

As already mentioned, attempts have been made to demonstrate by experiment a certain differentiation in the visual area, because, when the polar part of the occipital lobe is excited with electricity, the result is negative; if, however, any points on the external face of the occipital lobe are excited, and especially the superior part of the second external convolution in the dog, or the external face of the occipital lobe and the angular gyrus in the monkey, movements of the ocular bulb are produced in the direction of different meridians. On stimulating, however, the anterior tract of the second external convolution, the movements which result are no longer those of the ocular bulb, but those of the eyelids, which become spasmodically closed, just as when we shut the eyes voluntarily or are confronted by a powerful light, the orbicular contraction produced in this case representing reflex action.

The behaviour, so different, under electric excitation, of different parts of such an extensive cortical area, partial mutilations of which induce more or less marked permanent or temporary disturbances of vision, goes to signify, in my opinion, that the functional attribute differs in the individual areas into which we may consider the visual zone divided. I hold to-day also—and with more reason after the lapse of many years since first I formulated such a hypothesis—that one of these areas may be specially designed for the formation of *luminous images*, another for those of colour, a third for the formation of motor images of the *ocular muscles*, and that, finally, another part of that extensive zone may be the field wherein *the luminous images and those of the ocular muscles are fused and synthetized*, this union resulting in the *visual images* of the objects.

The different behaviour towards electric excitation of the diverse points of the cortex of the visual area has, on the other hand, suggested to some other experimenters, among whom are Munk and Schäfer, an interpretation over which I think it useful to pause. According to these physiologists, the retina would be, as it were, projected upon the corresponding cortical visual area; and as we can imagine each retina divided into sections, so also can we imagine the cortical visual area divided into so many other sections, corresponding to the diverse directions impressed on the ocular bulb by the action of the electric stimulus applied to the cerebral cortex. Schäfer, besides admitting that the visual area of a hemisphere may be connected with the two lateral homonymous halves of both retinæ,

holds that the superior zone of the visual area of a hemisphere may be connected with the inferior portion, the inferior zone with the superior portion, and the middle zone with the middle portion, of the corresponding lateral halves of both retinae. Henschen and Vialat are inclined to admit a cortical retinal projection, albeit without adducing decisive proof. Henschen holds that the central and peripheral parts of the cortical retina, corresponding to the homonymous portions of the ocular retina, would be situated in the anterior and posterior parts of the cortex of the calcarine fissure. With this view, however, Sachs and Soury do not agree. Hun has made reference to a case in which atrophy of the superior lip of the calcarine fissure produced hemianopsia of the inferior quarter of the visual field on both sides. Another convinced supporter of these doctrines is Wilbrand, who also refers to a case in which a lesion of the inferior lip of the calcarine fissure gave rise to hemianopsia of the superior visual field.

This division of the visual area is only hypothetic, because experimental destruction of very limited portions of the internal face of the occipital lobe, in the dog and monkey, discloses only one definite fact, and that is the ever-recurring phenomena of *bilateral homonymous hemianopsia*; that is, given a point of fixation, according to Foerster, which corresponds to the macula lutea, and given a lesion of the occipital lobe in any point whatever of the retinal projection of one side, we find there occurs in consequence blindness of the homologous halves of the retinae, but its limit does not pass through the point of fixation.

In our opinion, the differentiation of the visual zone on the cerebral cortex into areas corresponding to the different sections of the retina is a subtle explanation, pleasing to the preconception of the experimenter, but not a fact experimentally and clinically demonstrated. The constant or almost constant fact, on the contrary, is the representation on each cortical visual area of the two bundles of the optic nerve—the direct and the crossed. Moreover, according to Wilbrand and Henschen, each half of the two maculae luteae is in connection with the two cerebral hemispheres. Monakow is of a like opinion.

Munk advances another theory: he supposes that each cortical visual globe contains both perceptive elements and elements which serve for the preservation of images commemorative of the perceptions, and for their ideal representation. The perceptive elements correspond to the cortical retinal elements, and would be contained in the cortical territory for the projection of luminous impressions, the excitations of which would be propagated to the cortical elements for commemorative representation of perception, and thence to those of ideation. When the area of mnemonic representations is destroyed, there is no longer possible the awakening of an image, under the influence of an excitation, peripheral or central, with re-

spect to the homonymous halves of the two retinae. An animal in this condition sees, but does not recognise what it sees. It is psychically blind (psychic blindness). Henschen, Wilbrand, and Vialet share the same view; Henschen, in particular, wrote that the calcarine surface probably receives the visual impressions in the same manner as the retina, and transmits them for preservation to another point, more or less distant, of the occipital or the parietal lobe. Vialet distinguishes a visual centre of perception and a visual centre of memories, connected with one another by means of associative bundles.

This doctrine of Munk is contradicted by the experimental fact that the phenomena of blindness, observed in the greater number of the animals (dogs), are the more intense and persistent the more extensive the lesion of the occipital lobe. The mutilated dogs never become absolutely blind, even if the visual zone has been destroyed on both sides. In dogs, as well as monkeys, the phenomena associated with hemiopia are noted also following on lesions of the frontal lobes, and are sometimes persistent for weeks. One might vary the site of the zone of psychic blindness in the sense of Munk, then, without any difference of result other than in the intensity and duration of the phenomena.

The accurate researches of Monakow, like those of Colucci and my own, compel us to assign a larger area (as contrasted with Henschen's ideas) to the territory of cerebral vision, and we must at least admit with him that the limits of the visual sphere are not definitely fixed. For that part, psychic blindness can be produced by a lesion of the white substance, as well as by cortical lesions. This is shown by the effects which result from lesions of the associative paths between the different cortical areas, whose products ought to combine for the formation of the idea and notion of the object.

The subject affected by psychic blindness, in the sense of Munk, sees objects, but does not recognise them. He sees like an individual who has never seen objects in this world (if such abstraction were possible), and knows nothing whatever of the signification of form, weight, or size. Since, then, the part surrounding the destroyed visual zone is composed of homologous cell elements, which can by education and evolution perfect themselves, assume relations with the intact portion of the visual zone, and fix the images, the animal learns by degrees to recognise objects. This is the explanation of the recoveries which ensue within a certain time of the occurrence of the lesion.

I cannot desist at this point from entering into detail with regard to so important a question of psychology and anatomy. When it is affirmed that the images are formed in one zone of the cerebral mantle, and are preserved for their mnemonic representation in another zone, there is apparent the need of coming to an agreement

upon our interpretation of perception, because the perception of one of the components of the concrete image is one thing, the perception of the concrete image as produced by synthetic fusion of all the component elements whence it results is another. Luminous images, and those of colour, which are formed in the zone of retinal projection, represent only one of the components of the images of objects in the external world. If this is true, one can agree with the hypothesis that such elementary luminous images may become transmitted, by means of associative paths, from their own neurones to other neurones, where, blending with other elementary components, they form the concrete image. But if by the zone of retinal projection it is wished to imply the zone of perception—that is to say, of formation of the images of the objects—the hypothesis of those who maintain that there does not exist a coincidence of the centres of perception and of representation would be quite arbitrary. The point of commemorative representation of the images can only be the same as that in which the images are formed.

Our idea, conformable to the results of the best anatomical, experimental, and clinical studies, is, as already stated, that the visual area is rather more complicated than would appear from the earliest experiments. One part of it can be considered as the projection of the retina upon the cortex, with due consideration of the decussation in the chiasma, of a part of the fibres of the optic nerve. It is also certain that another part is a centre for ocular movements, and so for the oculo-motor images; and it seems clear that a third part is destined for the formation and registration of the concrete images which result from the physiological fusion of the two preceding elementary images. We must accept the idea that the concrete images may become transmitted from the point of formation to other more or less distant groups of neurones, which form in man an evolutive zone destined for the formation and preservation of images more complex, inasmuch as they result from the physiological fusion of the concrete visual images of objects with others of a different nature, for the formation, as we shall see further on, of the verbal images and the conceptions.

The following scheme (Fig. 45), guided by anatomico-physiological knowledge, seems to me to indicate more vividly the mode of formation of the visual images, their components, and their relations with other zones of the cortex. It has been adopted by me since 1897 (*vide* 'Sensory Phrenosis' and 'Progressive Paralysis'), and I think it renders sufficiently clear, not only the mechanism of perception, but likewise those of judgment and reaction. The scheme refers to the paths and stations of the nervo-luminous waves following an optic perception, and takes for granted the doctrine of the neurone, which does not compromise anything.

NR represents the neurone, which receives and modifies the luminous wave (retinal neurone). It represents diagrammatically

the different neurones of the retina. From the first station, the luminous wave, having now become a nerve wave, is transmitted along the fibres of the optic tract to the second neurone TO, representing the optic thalamus, where it undergoes another modification.

Naturally, the scheme supposes that the external geniculate body acts as a part of the optic thalamus, it being impossible in the scheme to introduce the results of more recent experiments, from which it would appear proved that isolated destruction of the pulvinar, without injury to the region of Gratiolet and of the external geniculate body, does not produce either hemianopsia or other visual

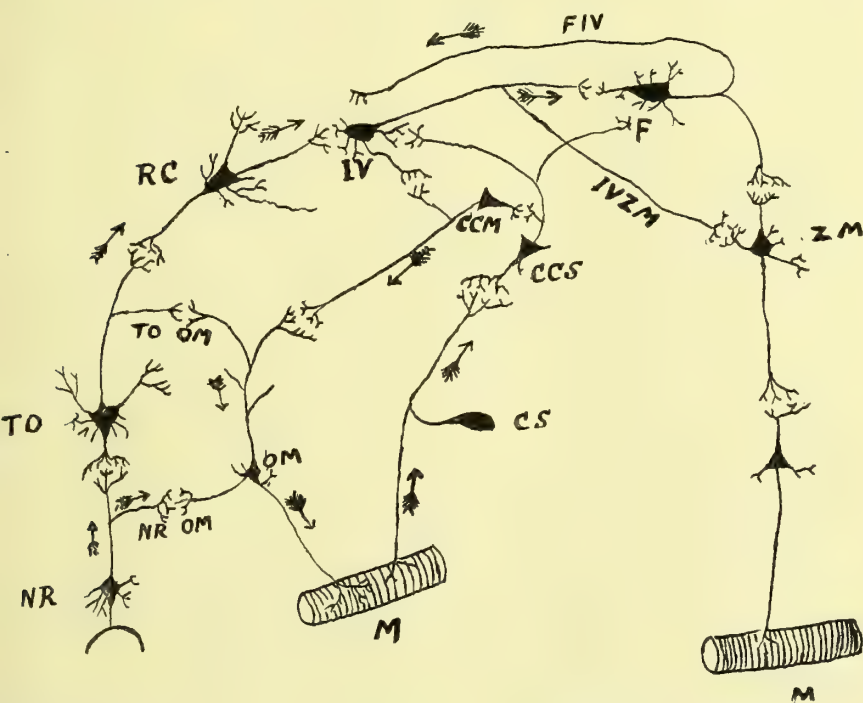


FIG. 45.—SCHEME INDICATING THE COURSE OF THE SENSORY WAVES FOR THE FORMATION OF THE CONCRETE VISUAL IMAGES, THE HIGHER MENTAL PRODUCTS, AND THE REFLEXES OF VARIOUS GRADES.

troubles, though the pulvinar should be retained as the centre of particular reflexes of sight, acting upon the physiognomy through the emotions, as those which determine *laughing* and *weeping*.

Meanwhile, the nerve wave NR—TO, independently of its connections with the optic thalamus, can also, by means of a collateral of the nerve prolongation of NR, meet the motor neurone OM by the path NR—OM: that is to say, the nucleus of the oculo-motor nerve, thus determining the simplest reflex. The nerve wave from the neurone TO passes, by means of the optic radiations or thalamo-cortical fibres, to the neurone RC, representing the visual cortical zone, or, rather, that part of it known as the retinal projection of

the cortex (lips of the calcarine fissure, cuneus, occipital pole). The nerve wave next produces in RC the phenomenon of psychic light, but cannot yet be the image of the object whence came the first luminous vibrations. This very complex result is obtained by the intervention of the senso-motor element, over which presides another anatomical apparatus. Contemporaneously with the wave NR—TO—RC, by means of the collateral TO—OM, or even the other NR—OM, the nerve wave, which, let us suppose, has produced in TO a simple sensation without distinct knowledge of the object (as certainly occurs in the lower animals, although in man the optic thalamus has various functions, as just mentioned), is itself transmitted to OM and to M (external and internal ocular muscles). Given the psychic fact of the sensation, this reflex, which comes by means of the path TO—OM, is much more complex than the first, NR—OM. By it the eye is directed upon the luminous object, by reason of adapted movements. These, meanwhile, determine centripetal waves of muscular sense, which either directly join the cortex CCS or indirectly—that is to say, after interruption in a subcortical station—before reaching the cortical senso-motor centre of the eye. As is known from recent histological researches, the fibres of common sensation are furnished with ganglia which are found on their course, and in the scheme are represented by the cell CS. The centripetal neurone CS transmits to the other neurone CCS the sensory nerve wave produced by the contraction of M. In the neurone CCS we have formed and registered the senso-motor image of the internal and external ocular muscles. From the neurone CCS the nerve wave in part discharges itself upon the cortical motor centre, rightly speaking, of the ocular muscles CCM, from which the nerve wave reaches OM, and in part is transmitted to the neurone IV, for the purpose of receiving and resolving the psycho-luminous wave transmitted by RC, the sensory-muscular wave transmitted by CCS, and the motor wave transmitted by a collateral of CCM. All these factors constitute the visual image of the object which is the result of their physiological fusion. The visual image, on the one hand, becomes transmitted as a nerve wave to F (frontal lobe), where, by physiological fusion with a greater or less number of other visual images and those of other senses, it takes part in the formation of the products of a superior order (associated groups—abstract conceptions), and, on the other hand, comes into relation with the neurone ZM, which represents in the scheme the cortical motor zone. This, in its turn, is also in relation with the neurone F (and it could also be so with the neurone RC). Such connections show clearly how some actions or movements can be determined by nerve waves from RC directly to ZM, others by nerve waves from IV to ZM, and others, again, by the nerve waves F—ZM.

We see as a result how this scheme permits of the interpretation of many of the more important psychic phenomena, and what signifi-

cation is to be accorded to the transmission of the content of IV to F. The other sensory areas we already know from what has been said of them in connection with the chapter on anatomy, and it will be more useful to return to them in the second part of this work, when dealing with perception and its disturbances.

Let us now see what signification should be attributed to the motor zone, but first of all let us make a brief historical review.

In 1870 Fritsch and Hitzig, experimenting on the cerebral cortex of the dog, defined some small areas exactly in the sigmoid gyrus, excitation of which, by electricity, produced movements limited to certain groups of muscles which altered according to the area excited. In this way there came to be defined the areas which govern the shoulder, the paw, and all the superior limb, besides those for the movements of flexion, extension, etc., of the posterior limb.

Hitzig, continuing his experiments on the monkey, elicited the same facts, and, in addition, found the areas still better defined and differentiated, the monkey's brain being more developed than that of the dog; and, pursuing still further his researches—which have remained, and will remain, the solid foundation of all future progress—he divided the cerebral cortex of the dog and the monkey into functional areas, on a secure basis, and was able to prove that these same muscles which contracted under the action of electricity remained, at least temporarily, paralyzed when their respective centres were destroyed.

Almost contemporaneously (a few weeks later) Ferrier, in England, demonstrated the same facts; as a result, control experiments were made on every side, so that there now stands confirmed this fundamental fact: that it is far from true that the cortex of the brain fulfils functions equal and universal in all its parts; that, on the contrary, it is distinguished into different areas of diverse functional dignity, some related to organs of sense, one in particular being responsive to electric excitation, and destruction of which is followed by paralysis of movement in the limbs of the opposite side.

Goltz, Schiff, Brown-Séquard, and a few other physiologists were the only ones who cast a doubt on the whole matter. It would appear that the existence of a motor centre is capable of easy demonstration by the fact alone that, on destroying the sigmoid gyrus of the cerebral cortex of the dog, or the Rolandic zone of the monkey, the animal remains paralyzed in the limbs of the opposite side; the dog, for example, walks with its paw bent upon the dorsum, or drags it along, or performs irregular movements similar to those seen in the subjects of ataxia, or shows, at least, loss of power on that side. Much discussion has been raised, however, concerning the nature of such disturbances, and hence of the function of that part of the brain, inasmuch as Goltz, with many others, has maintained that it really contains no cortical motor centres. Schiff, among the others, thought to prove that the paralysis in the dog and in the monkey

might be apparent only, and dependent upon anæsthesia of the limbs; that is to say, the destruction of the corresponding area resulted in the abolition of sensibility in the opposite side, but of nothing else.

Aroused by the experiments directed towards demonstration of the fact that diminished function of one of the limbs may arise through interference with motor power, Goltz sought to sustain his opinion by another series of experiments—by section of the posterior columns of the spinal medulla, by means of which he believed he could demonstrate the same motor disturbances of walking as appear on destroying the motor zone of the cerebral cortex. If from this experiment, then, it should be deducted that destruction of the posterior columns—which are the paths of transmission of cutaneous sensibility—produces phenomena analogous to those produced by destruction of that zone of the cerebral cortex known as the motor zone, such zone ought to be retained as the *central station* of the posterior columns, and hence a *sensory* centre.* Further, according to Schiff, the result of destruction of the so-called motor zone is not a motor paralysis, but simply an *ataxia* resulting from abolition of the cutaneous sensibility of the respective limbs. The doctrine by which the so-called motor centres ought not to be retained as motor, properly speaking, but as centres of sensibility, or representative of movements whose true motor nuclei would be located in the bulb or elsewhere, has been supported by many experimenters. Hitzig expresses the opinion that the disturbances of voluntary movements resulting from extirpation of the motor zone are the expression of disturbances of the representative activity—that is to say, of the suppression of the motor images of the various movements. If such images be wanting, the movements can no longer be represented, and either are not fulfilled or are defective.

Munk expresses almost the same opinion. He merely gives expression, on a larger experimental basis, to the same idea as Hitzig. The motor zone, according to Munk, forms a part of the sensory zone, which is much more extensive. The destruction of this sensory sphere (according to Hitzig, Munk, etc.) produces functional defects, which have reference to the various forms of sensibility of the different regions of the body. The ideas or images of contact, pressure, and temperature, formed by means of elementary cutaneous sensations, may be lost; or we may have suppressed the images of the positions in space of the diverse parts of the body, formed by cutaneous, muscular, articular, and aponeurotic sensations, and by the consciousness of muscular innervation. The movements, determined by discharges of the true motor centres at the base of the brain, project themselves on the cerebral cortex as images of completed move-

* It is also true that, about twenty years later, Hösel, Flechsig, and others were able, on different grounds, to state that the fillet of Reil reaches the motor zone.

ments, so that, on the cortex of the brain, there do not exist true motor centres, but centres of motor images, the elements for which are all of a sensory nature. The destruction of such a sensory sphere does not determine a true motor paralysis, because the disturbances of motion depend, according to Munk, on loss of memory of the motor images, through which loss there is no longer possible the representation, in the consciousness, of the symbols of existence, of the position, and of the muscular attitudes of the paralyzed parts. According to the idea which we hold to-day concerning reflexes, the doctrine of Munk resembles, on general lines, that of Hitzig, as well as that of François Frank, who considers the movements determined by excitation of the respective points of the so-called motor zone, analogous to reflexes, with this difference, that the ordinary reflex is provoked by a cutaneous stimulation, while those of which we have been speaking are provoked by cortical stimulation. According to Tamburini and Luciani, the so-called motor zone is a mixed one, and contains throughout both motor and sensory elements. Hence arose the conception of the senso-motor zone, which united the doctrine of Hitzig and Schiff with that of Ferrier, who maintained the exclusively motor nature of the zone in question. Luciani, in particular, insisted in his writings that the motor centres and the centres of sensibility which concurred in the fulfilment of a complex function were intermingled, or very close to one another, in the cerebral cortex. In this way the effects ensuing from the destruction of a given part of the senso-motor zone consist of paralysis or paresis of movement, and of a more or less distinct disturbance of sensibility. This doctrine found confirmation in the important clinical researches of Seppilli and the histological ones of Golgi, who, in a memorable article, upheld the uniform senso-motor function of the cerebral cortex, throughout which we find, in close proximity, motor and sensory corpuscles. According to Luciani, the senso-motor zone is not limited merely to the Rolandic region, but extends considerably as a zone interlocked behind with the visual area and in front with the frontal lobe. Just as this zone contains sensory elements for the muscles of the limbs, so the visual zone contains sensory elements for the retina and motor elements for the muscles of the eyes, and similarly with other sensory zones. The removal of the whole motor zone, or a part of it, revealed to Luciani, as to Hitzig, Schiff, and others, marked defects of tactile sensibility and, in a less degree, of the sense of pain and muscular sense (muscular consciousness).

According to Bechterew's latest observations also, the so-called motor zone is at once sensory and motor. By experimenting on the monkey, he came to the conclusion that with disturbances of motion there are constantly associated disturbances of cutaneous and muscular sensibility. In this senso-motor zone the muscular and cutaneous sensations are found co-ordinated with determinate move-

ments. This doctrine of Bechterew differs from that which the famous physiologist of Petersburg had expressed in previous publications, wherein he then held that the really motor zone was found very near to, but not mixed with, the zone of cutaneous and muscular sensibility, and that the latter was situated immediately behind the true motor zone, which would have for its seat the anterior part of the sigmoid gyrus in the dog, corresponding to the anterior Rolandic convolution in man, while the sensory area would occupy the posterior part of the sigmoid gyrus corresponding in man and in the monkey to the posterior Rolandic convolution. Notwithstanding this, Bechterew holds that the parietal lobe remains always the most conspicuous centre of sensibility, extending also in front upon the true motor zone.

In opposition to this doctrine, which considers the so-called motor zone as sensory, in the sense of Hitzig and Munk—that is, as a zone of motor images projected upon the cortex and exciting the underlying motor centres—and in opposition to the other, which, according to Tamburini, Luciani, and Bechterew, teaches that such a zone is composed of motor and sensory elements, placed promiscuously in the same cortical area for the individual regions of the body, stands the doctrine of Ferrier, according to which the motor zone is exclusively a centre of departure of the motor excitations for the individual muscular regions of the body, entirely distinct from the centres of common and muscular sensibility, which, according to him and his pupils Horsley and Schäfer, have their seat in the limbic lobe—the convolution of the hippocampus and that of the corpus callosum. Ferrier holds that there is no relation between the degree of alteration of sensibility and that of motor paralysis; that the motor centres of the cortex are anatomically different from the centres of general and special sensibility, and that the various forms of cutaneous and muscular sensibility can be profoundly disturbed or abolished, at least temporarily, by destruction of the region of the hippocampus, the result varying in degree and duration according to the extent and depth of the lesion, without there being any accompanying paralysis. The idea that the sensory centres, including that of cutaneous sensibility, were distinct from the motor centres was strenuously defended by Horsley and Schäfer, who found that extensive lesions of the gyrus fornicatus produced a remarkable and persistent anæsthesia in the whole of the opposite side of the body. The centres for the ideas of a movement, according to Ferrier, have a different seat from that of the true motor centres, destruction of the latter paralyzing the power of execution, not the ideal conception of the movement itself.

After the extension of localization of sensibility from the hippocampus alone to the convolution of the corpus callosum, as the result of the experiments of Horsley and Schäfer, Horsley, by another series of experimental proofs, was obliged to admit that the so-called motor

zone is also the seat of kinæsthetic sensations ; that by circumscribed lesions of the motor zone there can also be made apparent disturbances of tactile sensibility ; and that tactile sensibility (the faculty of localizing tactile sensations), the muscular sense, and the representation of the voluntary movements, exist together in the Rolandic zone.

Before proceeding further, it is well to determine what is a *volitional movement*, because one can understand how great a difficulty there may be in defining it, if, given a cortical lesion, we may have indeed to deal with a sensory disturbance, an intellectual disturbance, or a motor disturbance, such as arises from the section of a motor nerve or from a lesion of the spinal medulla. A volitional movement results from many elementary components. If I extend my hand, this act, which seems a functional unit, a simple phenomenon, a *fiat*, can be resolved into diverse elementary factors. In every volitional movement, in fact, we can distinguish—(1) *the image of the object* which is to be accomplished, seeing that there must be represented to one's self the purpose of the movement, otherwise it would not be intentional ; (2) *the image of the movement* which we have to effect, in order to attain the end in view ; (3) the moment in which we determine to fulfil the said movement, which can be expressed in a single word—*fiat*—(What this *fiat* is has not been determined by all in the same manner, and it is perhaps not easy to comprehend. To satisfy the inquiring mind, however, let us consider it as a state of tension, the highest degree of the *sensorial-emotional tension* which finds its consummation in the correlative act) ; (4) the *nervous discharge*, the calling into play of a group of muscles to accomplish the said movement, which corresponds exactly to the image representative of it ; (5) the consciousness of the movement completed, otherwise the registration of the image in the cerebrum, in relation to the whole personality executing the desired movement.

The volitional movement once shown to be impossible otherwise than as dependent on the concurrence of all these images or the psychic components of some of them, it is easy to understand how the physiologists, confronted by the motor disturbance which happens whenever any of these components are wanting, particularly the second and fourth, have attributed the paralysis sometimes to failure of the sensory component—the image of the movement—and sometimes to that of the motor component—*i.e.*, the cortical motor discharge. Thus, we have explained how it is that some have denied the character of motor to those centres discovered on the cortex of the cerebrum, judging them to be *psychic centres* where motor images are registered ; these being suppressed, the movement can no longer be effected. But others, like Ferrier, have vigorously maintained that in the case in question we have to deal with a true motor disturbance, with a *loss of power* varying in degree according

as the destruction of the cortical centres is more or less extensive. Others, again, like Luciani, Tamburini, Horsley, and Bechterew, have arrived at the conclusion that, in that excitable zone of the cerebral cortex, motor centres are commingled with sensory centres; consequently, its destruction produces diminution both of motor energy and of sensibility.

After frequent returns to the study of the subject, I feel that I cannot share Munk's opinion that that part of the cerebral cortex is merely a centre of sensory images of movements. It represents generally, if not exclusively, a cortical *motor* centre in the strictest sense, as is proved from two sets of data furnished by *experiments on animals* and *clinical observation*. These sanction the statement that after the removal of the motor zone the animal, notwithstanding a degree of locomotion, cannot perform certain specialized movements. A dog accustomed to give its paw, after mutilation produced experimentally in the excitable area of the cerebral cortex, *strives to do so*, but does not succeed. If movement on the sound side of a monkey be prevented, and a bunch of grapes, of which he is very fond, be offered him, he strives to seize it with the paralyzed hand, uses all his strength to reach the grapes, makes attempts at movement, or manages partial movement, but succeeds only when the sound side is liberated. Thus, the image of the object he has in view is not lacking; indeed, it is very doubtful if the *motor image* be wanting, seeing that the movement is completed in part, though undeniably there is *defect in power*, for which reason the movement is incomplete.

As far as direct evidence goes, all that one can demonstrate in dogs is that the limbs on the side opposite to the mutilated hemisphere are weakened. When we suspend by the trunk a dog whose motor area has been destroyed, it assumes each time the same position of extension of the anterior and posterior limbs, on the side opposite to the lesion. When the limb in connection with the sound hemisphere is stimulated, it becomes voluntarily retracted and flexed, while the other remains extended; sometimes, in fact, the more intense the stimulation the greater the extension of the limb. No doubt, sometimes movements are effected under certain conditions, which, however, I believe I can satisfactorily determine.

If the cerebral decortication be limited in extent, and there be spared a part of the motor zone, absolute or relative, the immobility of the limb is not so profound as in dogs in which the decortication has been more extensive. Thus only, in the case of the dogs experimented on by Schiff, can one interpret the possibility of voluntarily offering the paw. The zone undestroyed takes up the function lost through the traumatism, and makes good that of the small area removed.

Analogous movements are observed even when the motor zone is completely excised, either following upon repeated and more

intense stimulation of the paw or in association with movements of the sound limb when the animal is in no way restrained. I do not know how I could represent the mechanism of the partial movement, if from a cortical lesion the image of the movement itself should be wanting. But I am pleased to report here what I have had an opportunity of observing in other experiments. If a dog operated upon be placed on the edge of a table, with the sound half of its body in such a position that the unaffected limbs are folded under the trunk in a state of complete immobility, while the side opposite to the cortical lesion projects from the table with the corresponding limbs in a pendant position, it will be found that the animal makes *not the slightest movement* with these limbs, though the position be far from comfortable. When, however, it is placed with the sound side projecting from the edge of the table, it makes every effort with the corresponding limbs, hanging and free, to find a point of resistance, even be it the edge of the table, in order to support itself and rise from that uncomfortable and uncertain position.

According to those who uphold the sensory or psychic nature of the motor zone, the immobility in such cases as above ought to depend either on the diminution or abolition of the tactile sense in the limbs believed to be paralyzed, because they do not respond to any tactile or painful stimulus whatever, as when the hair is torn from the dorsum of the paw, or else on the failure of the reproduction of the images of movement.

But granted even that there may be defect of tactile sensibility, why should abolition of movement result from it, if the dog in the experiment remain with its eyes open? If we might judge by analogy, we would be compelled to absolutely deny the above interpretation, because in no case in man does anæsthesia produce abolition of movement. Hysterical women affected with profound hemianæsthesia perform, with the aid of sight, the most delicate movements with the anæsthetic limbs, such as those necessary in playing the piano; and I do not know of a single case in which, the sight remaining intact, alteration of sensibility—no matter of what nature, and from whatever pathological process—has had as a consequence the complete abolition of movement. The resulting movement would at most be inco-ordinated, but not completely abolished, because sight ought, at least in part, to supply the place of the tactile sense in accomplishing the movements; and if sight do not, the motor images furnished by the healthy hemisphere should supply those of the mutilated one. It would be rather strange were we to interpret the facts observed in animals in a manner quite different from that adopted in the case of man.

That the dog, when stimulated, does not react by moving its paws may very likely depend upon the abolition of voluntary movement, by which alone we can judge whether or not the animal has heeded a stimulus from which it seeks to liberate itself. In

fact, in man, in ordinary hemiplegia without sensory disturbances, or even when these are not marked, we can stimulate the paralyzed limb in any manner, yet without the individual being able to withdraw himself from the position taken up and from the stimulus which irritates him. He is able, all the same, to express his sensations by signs or by speech ; but if he be excluded from these two paths of communication with our judgment, and if we could imagine him in the same condition as the dog, we would confound in man, also, a motor with a sensory disturbance.

The affected limbs of those animals placed, as before mentioned, on the edge of a table or chair are found to be not only quite immobile, but also contracted ; they become *rigid in a position of extension*. The tactile stimuli applied to them *augment* the rigidity ; only by the use of force can they be passively flexed, and, if permitted, they return immediately to their former position. On palpation, all the muscles, particularly those of the antero-external region of the anterior limb, are found somewhat tense and prominent from contraction. Such a state of the paretic limbs is certainly closely analogous to that of the posthemiplegic contraction in man, only the degree of it is different in proportion to the degree of development of the cortical motor centres of the dog as compared with those of man.

We frequently meet with cases where men with limited cortical or subcortical lesions present slight paretic manifestations in a limb which, however, can be adapted, in a kind of way, to fulfil all ordinary requirements, but which now lacks, on account of the lesion, the agility and elasticity of a normal limb ; yet, when an extra effort is made, the limb, especially the hand and fingers, shows a tendency to rigidity. All patients in those conditions show the contracture in the superior limb more clearly when they are asked to grasp an object tightly in their hand—*e.g.*, the dynamometer.

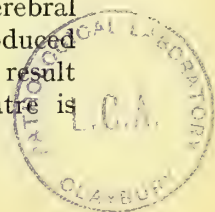
The animal which has suffered mutilation of the motor zone does not respond with movements to tactile stimuli, because it is paralyzed ; nor does a man ever respond by movement to tactile stimuli applied on the side of a hemiplegia except, when the paralysis is very slight. If the dog has no other way of expressing its sensations than by corresponding movements, we cannot infer that sensibility is absent when the movement is unaccomplished. All that we can logically and definitely determine, on the side of the more or less subjective interpretation of the phenomenon, is that state of almost absolute immobility, with *rigidity*, of the paretic limbs in the conditions indicated above, and this is not sufficient to end the discussion. With regard to this subject, I wish to refer here to one of the many facts I have observed in connection with dogs which have suffered mutilation of a portion of the brain, and which I extract from the register of my experiments. A bitch, some time previously under experiment, but apparently recovered,

comes in heat ; one of the dogs from which I had a few weeks previously removed the motor zone of the left hemisphere, and which also seemed to have recovered, attempts to cover her. He raises himself on his hind-legs properly, but, at the very moment when with the left anterior limb he embraces the female by flexing his paw under her thorax, the right anterior limb remains at first rigid and extended, simply pressed against the trunk ; then in proportion as the sexual excitement increases, the contracture of that limb increases. It then slips rigidly along the trunk of the female in forced adduction, reaches the gluteal region of the bitch in such a manner that it slips rigidly inwards and downwards, and, inasmuch as the position of the male is untenable, the act is frustrated. These attempts are repeated with the same result several times in succession.

In all this effort on the part of the dog to effect coitus, not only does he give no sign of a volitional movement with the rigid limb, however conceivably slight, and not only is he unable to adapt it for grasping the trunk of the female, but he can never prevent the rigid limb, withdrawn from the control of the will, from following the fatal direction induced by the contracture, and subtly impeding the fulfilment of the act. When has a disturbance of sensibility in man given rise to phenomena such as these ? Even in the gravest anæsthesia from a lesion of the capsule some movements are always possible, except when the lesion extends also to the motor bundle ; *vice versâ*, lesions of the motor bundle give complete paralysis even when sensation is preserved, which condition in dogs can be confirmed only by comparative observations in man.

As regards the clinical facts, it is certain that every cortical lesion of the motor zone of the cerebrum of man produces immediately paralysis of one or both limbs on the side opposite to the damaged hemisphere. But while this fact is constant, defect of sensibility is not equally so. Many observations are recorded in which disturbance of sensibility has been noted following upon lesions of the motor zone, and no one can disregard the value of the facts collected by Pitrine, Seppilli, and many others ; but there are some cases, also, on record in which tactile, muscular, thermal, and pressure sensations were preserved, while there existed paralysis of motion alone. I even hold that such cases occur more frequently than recorded, and contend that it is a bad method to collect and select only such as accord with a preconceived theory.

A second argument in support of the prevailing motor function of the zone mentioned I cull from another order of observations which I have been able to make in some cases of Jacksonian epilepsy. Granted that all the muscular groups are represented in the cerebral cortex, it follows from this that excitation of a given zone, produced experimentally or provoked by an irritative process, should result in contraction of that muscular group whose cortical centre is



excited or irritated. Before the motor centres were discovered by experiment, it had been noticed that certain non-destructive lesions of the motor zone, such as small tumours, small cysts, and especially gummata having their seat in the meninges over the motor zone, could from time to time produce nervous discharges to muscular groups corresponding to the irritated motor centres in such a manner that if the lesion corresponded with the centre of the lower limb the clonic contractions commenced in that limb; if with the upper limb centre, then the contractions commenced in the upper limb—*e.g.*, in the hand or some of the fingers. We can always produce at will contractions of determined groups of muscles by exciting with electricity now one point, now another, of the cerebral cortex, and we can determine *a priori* what muscular groups will be affected by the clonic contractions. If there were truth in the theory of those who maintain that we are not dealing with irritation of a truly motor centre, but of a sensory centre, or if it were true that it is the senso-motor image, the tactile, or that of muscular sense, which is reawakened by exciting the cerebral cortex, we ought to note what is observed every time any other sensory zone is excited.

If we excite the visual sensory zone we reproduce experimentally visual images. In man it has been possible to observe, when dealing with a non-destructive lesion of the visual area, the spontaneous reawakening of images of colours, lights, scintillations, figures, etc.

Excitation of the motor zone should produce corresponding tactile or muscular images—in other words, *true senso-motor hallucinations*. Such, however, happens only sometimes. Several patients with Jacksonian epilepsy have never admitted true hallucinations of touch or of movement. They have only felt the *spasm*; their consciousness has always been surprised by the involuntary contraction and by the sensation of spasm induced by the contraction. There are very few cases in which the movement is preceded or accompanied by cutaneous and muscular sensations.

Another argument calculated to show that the Rolandic zone is a cortical motor area is that from it emerges a bundle of *centrifugal* nerve fibres. Now, we know of no centrifugal nerve fibres that are not motor: the sensory fibres are all *centripetal*.

Seeing that in the cell strata of the Rolandic zone we find, as throughout the cortex, both motor and sensory cells (Golgi, Cajal), we can suppose, not without some probability, that the Rolandic zone may be at one and the same time a motor and sensory centre. Nevertheless, from the facts set forth above, we should also hold that the sensory area does not coincide exactly with the motor area, but extends upon the parietal and the limbic lobes.

The motor centres are divided into two sections: one more central, which we may consider as the centre of the movements of preservation and defence in the individual—a *centre of*

greater functional intensity—and a neighbouring zone which may be regarded as an *evolutive motor zone*.

The centre of greater intensity is found on the two Rolandic convolutions, especially on the anterior, while the evolutive motor zone extends more in front. In the latter the common motor function is weaker, mixes with other functions, and has a tendency to become more intellectual, as we shall see in the sequel. It is very probable that it serves as an anatomical substratum to the development of motility in relation to human progress (writing, special and delicate handicrafts, the manipulation of musical instruments, etc.). It is found, in front, at the foot of the frontal convolutions; behind, it extends to the ascending parietal and the superior and inferior parietal convolutions, where the motor function gradually diminishes and the sensitive and sensory prevails. The motor zone is hypothetically divided into different areas, each of them in strict relation to a given muscular region (see Chapter I., p. 61).

Still, the various cortical centres for the different muscular regions are only centres of greater functional intensity for the respective muscular groups, which are in reality represented by a much more extensive zone on the cortical areas for the two limbs. Indeed, a close observation permits us to consider as inadmissible the conception of *monoplegia* in the strictest sense of the word.

There are no precise limits either to the motor zone, taken in its entirety, or to the individual centres of the various muscular regions. The former is fused with the zone of development in front and with the sensory area behind; the latter are blended in a great intermingling with one another, and with the surrounding zone, a fact which affords an explanation of functional compensation. It frequently happens, in fact, that we observe that the motor and sensory disturbances caused by destruction of an area of the cerebral cortex disappear after a time.

To Goltz has been given the credit of drawing, more strenuously than any other, the attention of physiologists to this fact. No matter in what point of the cerebral cortex a lesion is situated, two orders of phenomena will result: (1) Phenomena depending on the state of temporary *arrest* in the surrounding parts, and sometimes also in parts distant from the site of destruction; (2) phenomena of absolute *defect*—what yet remains definitely wanting after restoration of the above. This is true in the case of animals, and much more so in man. If an individual is struck by an apoplectic attack due to cerebral hæmorrhage, embolism, thrombosis, or if from other causes a violent destructive lesion of the cerebral cortex is produced, there is manifested from the outset a more or less complete paralysis of one side; but sooner or later the profound paralysis disappears, and there remains a functional deficiency, which goes no further, and will remain a partial paralysis, a disturbance of sense,

a hemiopia, a psychic disturbance, etc.—in fine, a true defect, the nature of which depends on the situation and extent of the lesion. Why does the individual, completely paralyzed at first, recover his movements little by little ?

Two hypotheses may be offered : either the most of the initial phenomena were simply those of arrest, and, after some time, the brain having recovered from the shock and from the effects of the collateral disturbances of circulation, the function was renewed in those parts which had not been destroyed, but simply inhibited in their function, or the parts surrounding the destroyed foci had, by means of collaterals, established more direct relations with the peripheral organs, withdrawn from the influence of the centre by the lesion, and, in addition, developed enough energy to make good the functional deficiency of the part destroyed. Experimentally, I have noted, before others, that a dog in which part of the motor zone is destroyed presents in the first days after the mutilation a notable paralysis, which after a time disappears, leaving behind nothing more than a more or less sensible motor deficiency. If another portion of the cortex around the first focus is then destroyed, the paralysis reappears and is of greater duration ; and if, when the animal has again recovered, the destroyed area is enlarged anew, the paralysis reappears, more pronounced and more permanent than formerly. In this case the compensation is made by the parts of the cerebral cortex surrounding the lesion, which, being homologous, have developed a functionality primarily *latent*, but certainly due to the efforts which the animal repeats in order to fulfil those movements which have been abolished (educability of the zone of reserve). No one doubts any longer that every severe cerebral lesion produces not only a loss of function, inherent in the part destroyed, but also a condition of arrest, especially in the more neighbouring parts, on account of which the phenomena are more grave at first, while later on, when the functionality is reassumed by the centres which have preserved their anatomical integrity, the clinical picture becomes rather reduced.

When this does not depend upon the disappearance of a simple condition of arrest, but upon recovery from the paralysis, in spite of the existence of a small focus in the motor zone, as happens very frequently in dogs, it is to be assumed that a slow *compensation* has been effected by a part of the healthy surrounding zone of reserve. The parts surrounding the motor zone of greater functional intensity, though perhaps containing elements with other functional attributes than those belonging to the motor zone, yet certainly contain at the same time motor elements which, by being able to establish connections with the periphery, can in time assume, as the result of exercise, the suppressed functionality, and compensate the loss suffered.

It is erroneous to maintain that the corpus striatum can assume the function of the destroyed motor zone. This is contradicted by

the fact that destruction of the nuclei of the base (the caudate and lenticular nuclei) does not produce paralysis, and, further, that the corpus striatum does not assume relations with the pyramidal bundle. This view is proved both experimentally and clinically.

No one can agree with the hypothesis that the cerebellum assumes the function of the destroyed cerebral cortex. If it is admissible, as Luciani has demonstrated, that the motor zone may in part compensate the function of the destroyed cerebellum, in so far as the voluntary movements correct the cerebellar inco-ordination by way of the cerebro-spinal paths, the inverse by no means holds good, especially seeing that the cerebellum (as I was enabled to demonstrate) is not at all inserted in the course of the pyramidal fibres.* There only remains possible the cortical compensation, which is furnished partly by the cerebral cortex surrounding the destroyed area, and partly by the cerebral cortex of the opposite hemisphere.

That there may be a functional compensation by the other hemisphere we deduce from the following facts : When in an animal recently paralyzed on one side from a lesion of one sigmoid gyrus, but now recovered (at least apparently), we destroy the motor zone of the other side, there results not only paralysis of the side opposite to the hemisphere last injured, but, in addition, there is reproduced the paralysis of the other side. This paralysis is much more profound and permanent than that produced by extensive destruction of the motor zone of one side only.

The cerebral cortex is not merely the organ of sensations, movements, and the higher psychic functions : it is in addition the higher centre of all the organic functions. The respiration, the circulation, the sensations, and the movements of the internal organs, are all represented in the cortex of the brain, in which we have been able to recognise corresponding excitable points. Thus the cerebral cortex, being brought into intimate relation with every organ and tissue, effects their synthesis and assumes their government.

CENTRE OF RESPIRATION.—Danilewsky observed slowing of the respiration, with deeper inspirations and slower expirations, by exciting a zone coinciding with that of the facial nerve (relations between facial expression and respiration in the affective states?). Munk places the respiratory centre in dogs in the frontal lobe, a few millimetres in front of the chief frontal sulcus, which would correspond in the monkey, according to the experiments of the same physiologist, to the prefrontal sulcus, with this difference, that the

* The experimental conclusion that the volitional motor paths do not pass through the cerebellum has been contradicted by the hypothesis of V. Gehuchten, as we have seen in the previous chapter. Such a hypothesis, however, is not supported by incontestable proof. New experimental and anatomical researches are necessary before we can yet hold as proven the cerebro-ponto-cerebellar motor paths.

excitation (electric) of one point on the horizontal branch of the precentral sulcus produces tetanic inspiration, the excitation of another point a little more external in the same sulcus produces tetanus of the abdominal muscles. According to Munk, then, the centre of respiration is in the frontal lobe, in immediate relation with the musculature of the trunk. Unverricht and Preobraschensky found a centre of arrest of respiration on the third external convolution in the dog, external to the orbicular centre. Bechterew and Ostankow have always found quickening of respiration, with greater length of the expiratory phase, by exciting the anterior extremity of the second external convolution, immediately above the centre for the movements of deglutition. These diverse localizations are, in a measure, due to the complicated mechanism of respiration, while, on the other hand, they give some appearance of truth to the dictum of Bochefontaine and of François Frank, according to which excitation of any point whatever of the cerebral cortex is followed by a modification of the respiration. In the course of various researches on the cortical centres I have never experimented directly on those of respiration, but I believe that both those who localize and those who do not may be right.

I am convinced that all excitations of the cortex, in whatever point they occur, modify the respiratory rhythm, and that, on the other hand, there are zones in the cortex which are in more direct relation with the muscles of respiration. In the first case it is the sensory products of each cortical area—evoked in the form of images, by electric excitation—together with the relative emotional states which accompany them, that determine modifications of the respiration, variable according to the animals experimented upon and their ages.

In the second case we have to deal with direct relations between certain cortical zones and the musculature concerned in the respiratory acts, and it is quite natural that there should be, on the one hand, a zone for inspiration, and, on the other, one centre for acceleration and another for slowing of the respiratory movements; still further, that these centres should be near one another, and in intimate relation with the centres of physiognomic expression, phonation, deglutition, and that of the muscles of the trunk. They are not simple reflex centres, like those of the floor of the fourth ventricle, but are subordinate on the one hand to the will, and on the other (independently of the will) to the states of the sensory and sensor-motor areas, whence arise the affective states, which are always accompanied by modifications of the respiratory rhythm.

Upon the circulation the cerebral cortex likewise exercises its regulative influence. By electric excitation of the motor area Bechterew and Mislawski obtained acceleration of the pulse and modification of the blood-pressure. Excitation of the white substance, after previous decortication of the said area, produced not

only marked slowing of the pulse, but also, on prolonging the excitation, arrest of the heart in diastole. Evidently, then, the cortex exerts an influence, not only on the blood-pressure, but also on the activity of the heart. The researches carried out for some time by Tomasini, in my clinique, partly confirmed these results.

Deglutition and the movements of the stomach and intestines are likewise represented in the cerebral mantle. The centre for deglutition is situated on the anterior part of the second external convolution, outside of the sigmoid gyrus, and in proximity to one of the respiratory centres (Bechterew, Ostankow) and the centre for movements of the mouth and lower jaw, besides that of the tongue. The experiments of Kethi have demonstrated the succession of movements of deglutition to those of mastication by exciting with electricity, in dogs, an area situated upon the sigmoid gyrus in front of and external to the centres for the limbs. The succession of movements of deglutition to those of mastication ought to take place through anatomical connections corresponding to the physiological fact. Kethi admits, therefore, a centre for co-ordination of the movements of mastication and deglutition. Such a centre might be apparent from the fact alone that the combined movements can certainly be produced by cortical excitation, though in reality dependent upon the inferior centre, which Kethi and Bechterew have affirmed to be in the posterior part of the optic thalamus.

Further, in proximity to the crossed sulcus centres of movement for the stomach are found. As is well known, the movements of the cardiac end are opposed to those of the pylorus, in such a way that the opening of the cardiac end coincides with the repose or with constriction of the pylorus, and, *vice versâ*, the movements of the pylorus, which are active when the stomach is full, coincide with a state of inactivity of the cardiac end.

Corresponding to this physiological fact there is found on the cerebral cortex, in the neighbourhood of the crossed sulcus, a dilator centre of the cardiac end, excitation of which, by relaxing the cardiac end, determines contraction of the pylorus. *Vice versâ*, the excitation of the posterior and external parts of the sigmoid gyrus reinforces the rhythmic movements of the pylorus so far as to determine a contraction of the whole pyloric region. The stimulation of the antero-external part of the sigmoid gyrus determines the contraction of the cardia and the cardiac region, while the pyloric region remains in a state of rest.

The faradic excitation of the posterior part of the sigmoid gyrus and of the adjacent posterior and external part of the second external convolution, according to the experiments of Bechterew and Mislawski, modifies the muscular tone of the intestinal walls. Further, the excitation of a small zone of the cortex, situated behind the posterior extremity of the fissure of Sylvius, between the occipital

and the temporal lobes, frequently induces contraction of the large intestine.

The experimental researches of Bochefontaine first, and afterwards the more recent ones of Bechterew and Mislawski, and of Mosso and Pellacani, have demonstrated that the movements of the bladder likewise possess a cortical centre. According to the first of those observers, such a centre is found on the external face of the sigmoid gyrus; according to Bechterew and Mislawski, it is found on the internal or interhemispheric aspect of the same gyrus. Mosso and Pellacani have more clearly confirmed the existence of a cortical centre for the bladder.

The movements of the sphincter of the anus, and even the co-ordinated movements of defæcation, possess, like those of the bladder, their cortical centres. This was located by Sherrington, in the case of the monkey, in a very circumscribed area on the posterior part of the paracentral lobule, the excitation of which provoked movements of the sphincter. Meyer located this centre, in the inferior mammals, on the posterior convolution of the sigmoid gyrus, at a greater distance from the crossed sulcus. V. Duneschi placed it a little in front of the point indicated by Meyer, while Gustavo Mann, by exciting the same cortical zone indicated by Meyer, provoked, not isolated movements of the external sphincter, but strong contractions of it, along with movements co-ordinated for defæcation and emission. The above centre is in proximity to that for the tail.

Bechterew and Mislawski combined to delimit also a centre for movements of the vagina. On the contrary, they found two of them: one excito-motor, on the posterior branch of the sigmoid gyrus, and the other of arrest, on the tract of communication between the posterior and anterior branch of the sigmoid gyrus, and sometimes also on the superior border of the second external convolution.

The secretions also are influenced by the excitation of determined areas of the cortex. The salivary secretion has been the object of particular researches by Bochefontaine and Lepine, who found that faradization of the sigmoid gyrus provoked secretion of all the salivary glands, especially of those on the opposite side. According to these two authorities, the excitable zone, capable of provoking the salivary secretions, extends to the anterior part of the sigmoid gyrus and to the adjacent parts of the first and second convolutions. The more numerous and accurate experiments of Bechterew and Mislawski, however, have shown that the centre of greater functional intensity for the secretion of the salivary glands is found on a small area of the fourth external or primitive convolution, situated above and in front of the fissure of Sylvius; and that the anterior region indicated by the two preceding experimenters does not yield positive results, unless with a stronger excitation. The path for transmission of such influence of the cortex upon the

salivary glands would be, according to the researches of Cristiani, that of the sympathetic.

On the internal aspect of the hemisphere of dogs—corresponding to the anterior and posterior convolutions of the sigmoid gyrus in man—there has been localized by these same experimenters an area, excitation of which provokes the secretion of tears. The stimulation of the external face of the hemisphere has not admitted of the recognition of any point excitation of which would yield reliable results. The stimulation of the above centre is very quickly followed by a profuse flow of tears from both eyes, but more abundantly from the one opposite to the excited hemisphere.

Of other secretions we know little as regards their relations with the cerebral cortex—just so much as has been furnished by the researches of Bochefontaine. He observed, on faradization of various points of the sigmoid gyrus, an arrest of the functions of the liver and pancreas. While before the excitation 20 drops of bile per minute trickled from the cannula inserted into the bile-duct, none was seen during and for some minutes after the excitation. Further, the pancreatic secretion was greatly checked by electric stimulation of the crossed, as well as the frontal, convolution immediately in front. Nothing of a like nature is known of the cortical centres for the mammary and other glands. This chapter of physiological anatomy is still somewhat poor; but one can well foresee that all the glands may be connected, naturally indirectly, with the cerebral mantle, which represents only the ultimate station in relation to the intermediate ones found in series in the spinal medulla, in the corpora quadrigemina, and in the optic thalamus, and that, in consequence, they must be of considerable importance in their relations with the other regions of the mantle. On this fact depend the well-known modification of the secretions in emotional states and the representation in the unconsciousness of the work of the glands, whence go out nervous impulses which (like those of the muscles and of the other glands) help to constitute the personality and character.

Does the cerebral cortex possess also an area which regulates the temperature of the opposite half of the body? Experiments have supplied an answer in the affirmative. Those of Hitzig have not been contradicted. The destruction of areas of the mantle corresponding to the motor zone, or adjacent to it, produced immediately, and before the dog had revived or executed any movements, a great increase of temperature in the limbs opposite to the injured hemisphere; such increase was from $1\frac{1}{2}^{\circ}$ to 3° , and even as high as 7° , C. Excitation with a weaker current produced slight reduction of temperature up to six points of a degree in the opposite limbs. The results of these experiments were confirmed in their general lines by Eulenburg, Bechterew, and Schüller.

From the fact that not only the muscles, but also the respiratory,

circulatory, intestinal, hepatic, visceral, and other organic functions, are represented in the motor zone and its neighbourhood, the idea has arisen that the sigmoid gyrus in the dog, and the Rolandic convolutions, together with a circum-Rolandic zone, in the monkey and in man, ought to be considered as an area of convergence of the nerve waves coming from all parts of the body, or at least as a higher organ for the functions of organic life, and a field for the formation of the physiological self-consciousness.

LANGUAGE

Alongside the sensory and motor function of the brain we must take under examination another, which, in its essence, is also sensory and motor, but of an order more akin to the intellectual. I refer to language, the centres for which, as we shall presently see, are found towards the limits of the sensory and motor areas, in the territory of what I denominate the evolutive zone.

Language, which from the beginning is only an emotional reflex, has attained a very high place among the functions of the brain, and has become likewise marvellously complicated, as is easily understood when one remembers that it sums up all the intricate mechanism of the functions of the cerebrum. Such functional complexity and so high a psychic value could only result from a greater activity of the cortex of the brain, on which the force of evolution has ploughed up very large and fertile provinces, previously uncultivated; and from the primitive and circumscribed plots, whose product was entirely insufficient for the ever-changing and intricate conditions of life, the same agency has greatly extended and widened its dominions.

The fact that from simple articulate sounds language has attained the degree of development at which we find it to-day is proof in itself that an analogous perfectioning has been realized in the cerebrum, which in language unfolds one of its most complicated functions. Further, in my opinion there can be no doubt that this progressive development has for its base a successive differentiation of the various zones which are the organic substrata of the elementary factors of which language is composed. Speech is the product of a complicated function, in which co-operate numerous psycho-physiological factors, and is coextensive with the anatomical basis. As the expression of thought it cannot be studied merely as a form and an unfolding mechanism of the ideas, but we must also take into consideration, within certain limits, the content itself of the language—the ideas or thoughts.

One can affirm without fear of exaggeration that the study of language is the widest and most difficult of all those involved in the elucidation of the cerebral functions. In the natural sequence of things, language and thought have their evolutionary histories closely

linked together and bound up intimately with many different constituent elements.

Factors of three orders enter into the complex mechanism of spoken and written language : (1) The images of the things, the ideas, the concepts, their relations, their components, their manner of succeeding one another, their derivations and compounds, in never-ending series—these are the psychic factors of language ; (2) the words considered as a sensible form in which the thought is moulded—auditory, visual, and kinæsthetic images, or phono-articulatory and phono-viso-graphic formations, independent of the ideal content which they express, including the mechanism of their formation and the sensory and motor elements concerned therein ; (3) the phono-respiratory-articulatory peripheral or subcortical mechanism of spoken language and of the movements of written language.

Language expresses ideas, or notions and emotions, and therefore possesses a subjective as well as an objective side. It has the power of arousing in individuals who hear us and fully comprehend us the same emotion (besides the notion) as we ourselves feel. On the other hand, there is good ground to believe that in its earliest development it has been almost exclusively emotional, and little by little has become more comprehensive, serving to express notions rather than emotions.

Simple vowel sounds, and even the countenance and gesture alone, are more than sufficient to express the emotional states of the mind, while it is impossible to express notions other than by words which give a sensible form to determinate thought, whose accumulation and combination constitute the properly intellectual language, which may possess a more or less emotional coefficient. The emotional language ever remains the mode of communication between animals (song, cries) ; it is understood by animals of the same species, being capable of producing like emotions in all of them. Here is an example : A swallow, finding its nest occupied by a sparrow, invites the latter in its own language to depart ; complaints, however, appearing useless, it goes off to invoke the aid of its fellows. Soon after, the swallows, in goodly numbers, make a demonstration before the usurping sparrow, all flying together before the occupied nest. This simple device also proving fruitless, they fly off, only to return laden with clay, with which they proceed to confine the careless and haughty invader in the nest so insolently appropriated. It is evident that the swallows must communicate emotions and images—certainly emotions rather than notions. Similar examples in the life and customs of animals are by no means infrequent. If, however, these have a bearing upon the comprehension of the emotional side of language, it is yet more important to us to consider language especially as the expression of thought.

The reader is already acquainted with the present extent of our knowledge concerning the perceptions and the areas where the

images are formed and preserved. In this connection I have chosen the visual images and the visual zone, in the first place because the visual area, as we have said, is best known, and in the second place because the psychic content of our language is in great part visual, or derived from visual images. All the auditory images which are not words (sounds, musical tones, rumblings, etc.) are emotional rather than intellectual; to become such it is necessary that they be associated with a visual and tactile image. The song of the nightingale or the sound of the violin is intellectual only when we possess the visual and tactile image (as happens in the blind) of the nightingale and the violin, and these form psychic compounds by combination with other psychic or simply sensory products. While the visual and, to a slight extent, also the tactile zone provide us with immense objective material capable of being transformed into language, the auditory zone furnishes us only with emotional material, with which Nature hurts or pleases our senses, and with linguistic material, which has been accumulating in proportion as the emotions and images are themselves translated into spoken language.

We arrive at the conclusion that the whole brain concurs in the formation of thought, inasmuch as this is only the physiological fusion of simpler images, which in their turn are furnished by different orders of neurones scattered or grouped together in the different regions of the cerebrum. The ideas evolve themselves and become more complex by association with and assimilation of new factors, while the anatomical field, whence they draw their formative elements, becomes progressively more extended.

Thought arises in the field of the concrete images on the one part (sensory zone) and in the field of the abstract ideas on the other (frontal lobes; see afterwards), and therefore we may conclude on good grounds, contrary to several other authorities, that there exists an intellectual field distinct from that of speech, considered *per se*, and that this can be disturbed, not only when the organs of its direct formation are injured, but, in addition, when there is injury of the mechanisms formative of the concrete images and of the abstract ideas, or when there are interrupted either the paths which establish connections between the different parts whence there results a complex idea, or the paths between the ideative representations and the kinæsthetic fields whence they become expressive.

We may imagine we have satisfactorily delimited the intellectual field connected with the function of language, but such is not the case, except so far as is requisite for a schematic exposition. There are as many intellectual centres as there are series of empirical images bound to words. The words 'pen,' 'ink-bottle,' have their respective empirical images in the visual zone; the words 'blowing,' 'rustling,' 'whistling,' have their predominant sensory equivalents

in the auditory centre ; the words ' rough,' ' polished,' ' hectogram,' have their respective images in the tactile, visual, and muscular centres ; the words ' school,' ' war,' ' humanity,' have their intellectual equivalents in the frontal lobes.

No matter what the origin of images which become suppressed, there results therefrom an amnesic disturbance of speech, and there is every reason to believe that there may be as many forms of amnesia as there are sensory or perceptive areas in the cerebral cortex. Accordingly, if through destruction of a perceptive zone, or of that of the concepts, certain categories of images disappear, and if the image lost is not substituted by another allied to the same word, this will not be recoverable. For example, if at night we hear the tolling of a bell, the word ' bell ' will be revived by the auditory image. In the daytime the same word comes to the lips if we happen to pass near a belfry and our gaze fall upon the bell. One of these images is alone sufficient to arouse the auditory or the kinæsthetic image of the word and to permit of the pronunciation of the word ' bell.' Smell and touch enable us, in the dark, to recognise the flower and pronounce the word ' rose,' and the same thing can happen on beholding it from a distance. Cases occur in which an extensive cerebral lesion destroys one or even two of the sources of the images referable to the same object, yet the word persists, because only one image is necessary in order to arouse it, although this occurs with greater difficulty.

In this way we have an explanation of the formative disturbances in the field of the images or in that of the concepts, constituting a first class of amnesias of speech, which I shall designate intellectual, and further distinguish into imaginative and conceptive.

Does there exist a centre of intelligence distinct from that of speech ? Among those authorities seriously occupied in the study of language a great difference of opinion prevails concerning the existence of at least one, but mayhap of several intellectual centres distinct from those of the images of words. Broadbent especially, since 1872, has treated the subject with the greatest width of observation and with most appreciation of the facts. He then advanced the view which to-day we can still hold, founding our modern observations upon anatomical and physiological knowledge then non-existent, that there are rudimentary perceptive states which furnish simple attributes of things, wherefrom we pass to elaboration of a higher grade resulting from combinations of perceptions from which we form the conception or the general idea of an object. The formation of the general idea of an object is accompanied by the association of a name expressive of that object. The high elaboration, the fusion of the various perceptions, does not take place through radiation from one centre of perception to all the other correlatives, as Bastian maintained some years previously, but by convergence

of the products of the various perceptive centres upon a common intermediate cell area.

This intermediate cell area, wrote Broadbent, forms a kind of supreme centre composed of convolutions which do not receive fibres of projection. More than twenty years previously, then, Broadbent had put forward the question which Flechzig, relying upon anatomical research, believed he had fixed upon a sounder basis. Where we cannot agree with Broadbent is in his affirmation that the centre of concepts would be the centre for names. We shall see later on that this doctrine is untenable.

All those others who, after Broadbent, have spoken of a distinct intellectual centre, such as Kussmaul, Charcot, Bernard, Ballet, Lichtheim, and several others, with the exception of Grasset, and latterly of Pitres, who handles the subject more clearly, have kept themselves in a field of the abstract, and have reproduced their abstractions in diagrams which have not had psychological or anatomical explanation in any individual case.

The localizing doctrine, as above described, does not find favour with many other no less worthy writers. Among these are De Watteville, Ross, Allen, Starr, Wyllie, and others, who do not admit the existence of separate centres for the conceptions. Bastian, in particular, has written in a recent work: 'I am unable to find from clinical data any clear evidence proving the existence of defect of speech, which can be explained only upon the supposition that there exists a lesion in the centre of the conceptions or in the course of its afferent or efferent fibres. . . . It seems even probable that there is no line of demarcation between the various sensory areas and the conjoined areas called associative by Flechsig, and that the sensory areas, together with the conjoined, are accustomed to functionate more or less simultaneously.'

The existence of centres for the images of objects and their abstract conception, distinct from the sensory centres for their denomination, arises, in my opinion, from this, that the verbal image is, on the whole, distinct from the image of the object itself to which it refers. We very frequently recognise objects without being able to name them, and as frequently do we recall the name of an object whose image is not reawakened, or which appears more slowly in the memory. Clinical observations show likewise how, by certain lesions, one can recognise an object with the sight without being able to give it its name, and how, from certain others, one can repeat the name of an object without being able to reawaken the image of the same. All this shows with sufficient evidence that the two images are distinct and furnished by two separate centres associated with each other. Further, the story of the development of thought and of speech furnishes fresh proof of the value of the theory I maintain. An infant has already a significant possession of images of persons and objects before the formation of the corre-

sponding verbal images. Again, animals, which do not speak, recognise a number of things and persons.

Rather more difficult is the solution of the problem from the side of the abstract conceptions, which very naturally cannot be reawakened unless by means of the sensible form of the respective word with which they are strictly allied and well-nigh fused. It is certain that we may be able to reproduce the image of a man without need of the word 'man,' but we will not be able in any way to form the conception of humanity without the word 'humanity.' The very most we can do is to figure humanity to ourselves by dividing the conception into its concrete images of different men with varying human attributes, in which case it ceases to be an abstract conception. The coalescence of the word with the abstract conception, and the impossibility of separating them, do not warrant us in denying that they are formed in different areas. Leaving aside, too, all the clinical observations, the experiments done by me in the inquiry into the functions of the frontal lobes, and the legitimate conclusions at which I have arrived, we can obtain from another source good arguments for considering as distinct the two elements, mechanism and site, and these are furnished by inquiry into the state of language and intelligence at one moment of their respective evolution. An idiot, *e.g.*, can learn to pronounce the word 'humanity' without having the conception of humanity. In the same way, the child calls all the men it sees 'papa,' because it has not yet the abstract conception of father, but has only the concrete image of the man who most frequently fondles it. If, then, the word can be learned and pronounced completely void of conceptive significance, as in the case of infants and idiots, and if it be true that even the demented, when their intelligence is resolved into its elements, can pronounce many words deprived of their signification and devoid of any conceptive content whatsoever, inasmuch as the concepts themselves are resolved into their imaginative elements, many of which have been lost with the destruction of the mind, one can only conclude that the words which clothe the conceptions have a seat of distinct formation, and that, whilst in one case the conceptions may disappear and the words remain, in another the latter may disappear and the former remain in a state of latency. The sole difference lies in this, that there will always be wanting sensible proof of the existence of the conception on destruction of the centre of the images of the respective words, because in no manner are these conceptions reproducible unless by means of a concrete and simple form, which is that of spoken and written language.

We need no expenditure of words to show that the conclusion drawn from what we have so far set forth is that all the sensory areas of the cerebral mantle, besides the conceptive, to which we shall turn our attention later on, ought to be regarded as the intellectual

field of language, inasmuch as they furnish concrete images and conceptions which form the substance of speech, and that, in consequence, there are many forms of amnesic aphasia, seeing that if it is competent to apply the word amnesic to that form of aphasia in which the word cannot be recalled, when there is wanting or cannot be aroused the verbal image which determines its articulation, then in like manner the same word will not be capable of being aroused and pronounced when there is wanting the image of the object, which ought to reawaken that of the respective word. In each case the phenomenon can assume the same external form, although the origin is different; and if we add still a third, when by the interruption of the paths of association between the image of the object and that of the word the former cannot reawaken the latter, the effect is identical.

A form of amnesic conceptive aphasia is not so capable of demonstration, because in the cases where the concepts are defective the words can be pronounced if rearoused by simple concrete images, and we shall find ourselves confronted by examples of more or less serious intellectual disorders which we cannot examine in detail in this part of the work. When, on the other hand, the words which clothe the concepts are defective, the latter cannot be utilized in the psychic manifestations of the sufferer, because, as we shall presently see, according to the part they play in the mechanism of psychic life, so they are clothed in a sensible form—the word. It is quite apparent, then, that the old conception of amnesic aphasia is much enlarged, and applies to all the partial and total failures of words or of the whole language, according as it depends either on a lesion of the verbal images or a lesion of the centres of the images of the objects, and it is easy to deduce that one cannot assign a specific site to amnesic aphasia. All those who are anxious to demonstrate the contrary either make reference to the most classic of the forms of verbal amnesia in the sense of Charcot, viz., the acoustic, or have fallen into the error of utilizing, without much criticism, the doctrines of Flechsig. There cannot be a fixed and exclusive seat of amnesic aphasia, but just as many seats as there are various forms of it.

Furthermore, it must be noted that, as in different individuals the various cerebral provinces are not equally cultivated and fertile—the temporal province being more prolific in some, the parietal in others—the natural result is that lesions of the same extent and depth, granted that this be possible, produce effects different in proportion to the loss of the intellectual or verbal capital.

To this incomplete conception of amnesic aphasia Pitres also has given expression, and he even admits a psychic field which, according to Sollier, would be that in which the images are deposited, and whence issues the evocative impulse. Amnesic aphasia would be produced by interruptions of the fibres which unite the centres of

language with the centre of ideation (it is more correct to speak of the field of ideation). In other words, amnesic aphasia would be one of the forms of subcortical aphasia; in fact, one might even term it aphasia of association. In such a case the repetition of the word pronounced by others, and understood and recognised by the patient, could occur by collateral paths, and especially by the commissural paths of the right hemisphere. It is quite evident, however, that this is only one form of amnesic aphasia.

Clinical observation, moreover, compels us to admit a form of asthenic amnesic aphasia, which can be observed in some cases of neurasthenia and incipient degenerative processes of the cerebral cortex. There are individuals who possess ideas, and preserve, within certain limits, the power of representing what they wish to express, but who fail to find the word. This asthenic form of amnesic aphasia consists essentially in this, that the sensory images of the word, the auditory and the visual, which are furnished essentially by a series of sensory factors that ought to concur in the formation at first of the image of the object, and thereafter the verbal images, are so feeble that they do not succeed in combining and presenting themselves in an efficient manner. For example, the conception of a key results from a series of sensory factors—the form of the key, the weight of the key, the conception of iron in the key, and then the noise of the key in shutting the door, concerning which Dante speaks in these words to Count Ugolini: ‘I felt the locking of the door at the foot of the horrible tower’—that is, as the result of the noise, he had presented to him first the image of the key in use, and then the thermic sense of the key when taken in the hand, but more especially the muscular sense of the act of turning the key in the lock. We have here, then, a series of images which are related to the image of the key, and all should concur in forming the abstract conception and the sensory image of the word. If, however, those images are so feeble that by arousing one the others are not evoked, because the nerve current does not reach all the neurones in which they are formed, the representation of the verbal image of the key cannot take place. In these cases, if the images make themselves felt more strongly through a reawakening by actual stimuli (as when the key is given into the hand of the aphasic), the corresponding word is rearoused and pronounced.

The study of language has rather a wider scope than has hitherto been accorded to it, even by some very recent authors. The amnesias of which we have so far spoken cannot be separated from the aphasias in this respect, that if aphasia is motor in its aspect, consisting in the inability to reproduce the kinæsthetic images of spoken language—whence the impossibility of expressing thought in spoken form, which in its essence is nothing else than an amnesia of the kinæsthetic images—then amnesia is the incapacity to reproduce the auditory or visual images of the words,

according to the feebleness, paralysis, or total destruction of the corresponding formative and recording centres of those images. Having admitted the fact of the existence of distinct centres composed of specialized neurones where are formed and registered the images of objects and the visual, auditory, and kinæsthetic images of words, one cannot but agree that a paretic condition (not destruction) of the various centres must consequently bring about an inability to reproduce a more or less considerable number of the respective images; hence the diverse forms of amnesia and of amnesic aphasia which we can distinguish as visual, auditory, and tactile.

In my opinion, however, the study in question can only advance on the exclusive basis of clinical and anatomico-pathological facts. Thus, it is upon the ground of observation of the visual or auditory faculty of individuals who remember less easily than formerly the verbal, visual, or auditory images of speech that I found the existence of particular forms of amnesic aphasia through weakness (degenerative processes) of individual centres for the verbal images. Such individuals have lost more or less of their faculty of reproducing the images of words, and have a correspondingly greater or less facility of speech. In other words, their speech and their writing also have become poorer, harder, and slower. This condition of things is brought about by two orders of facts—either it is due to a cortical or subcortical destructive focus, which, by vicinity and all those nutritive disturbances which a destructive focus induces in the surrounding cerebral zone, paralyzes the centre of verbal images, or there exists a neurasthenic condition of one or both centres.

I have had an opportunity of examining several individuals who, formerly ready and happy in their reproduction of all the words learned during the period of their education at a certain period in their lives—frequently not advanced—lose that property which rendered them as speakers ready, acute, and felicitous in adapting to each thought the adequate expression, to each object the proper name. Individuals who have read a great deal, and who, after having brought themselves to a high grade of education and potency, have excessively exhausted the visual centre of speech, where they had accumulated a wealth of images for the service of the whole intellectual and linguistic mechanism, observe a difficulty and sometimes an inability to reproduce with the same readiness as formerly those images which render language richer and more ornate.

As much may be said with regard to the phonic images in the case of those who have been accustomed to listen. If these forms of verbal amnesia have so far eluded clinical analysis, and are considered under the general conception of cerebral neurasthenia, no one who henceforth will devote proper attention to the subject will, in my opinion, be able to dispute that these forms of neurasthenia, so far from being generally dependent on the entire cerebral function,

are due to paralysis of the most delicate centres, latest in cerebral development, and yielding the most complex product of life, which is language. Further, the disturbance resulting from it is precisely an amnesia, which differs in no respect, as regards the mechanism and essential manifestations, from the amnesic aphasia induced by destructive foci in proximity to the auditory and visual centres of speech.

From all we have said, the legitimate conclusion drawn is that amnesic aphasia cannot have one seat only, but a number corresponding to the various forms of it and to the relations between the verbal sensory areas and the other cerebral regions. If we are dealing with individuals with a trained auditory faculty, a lesion inducing a state of arrest or of paresis of the first temporal convolution causes an amnesic aphasia (Charcot) ; if, on the other hand, with persons educated to speak by preference from the visual images, which by prolonged exercise have acquired a capacity of easy and ready reproduction and a greater vividness than the auditory images, a paralysis affecting the visual centre will suppress the visual image.

The commissural bundle between the auditory and the visual centre of speech may be interrupted, and in this case (granted the relations of functional dependence of the one centre upon the other) the two centres are found in a condition of paresis or of arrest, and although both centres may be themselves unimpaired, they will no longer be able to furnish all the images requisite for articulate speech.

In the same way, if there be an interruption of the path between the conceptive field and the auditory and visual sensory areas, as well as the kinæsthetic, there will be equally a defect of speech, because the ideas, now less vivid and more difficult to recall by reason of the broken relations resulting from failure of some components, are no longer able to reawaken the auditory, visual, or kinæsthetic images which are necessary to bring into play the motor centre of speech. We will resume this question, however, when we take up the disturbances of memory.

INTRINSIC FACTORS OF SPEECH.—So far we have occupied ourselves with the intellectual factors and their fundamental importance as the substance of speech, and with the forms of aphasia (amnesic) which arise either from a suppression of some of the intellectual components of language or from some impediment in their interrelations. Let us now turn our attention to the intrinsic constituent elements of speech considered *per se*, and which, in order to distinguish them from the above, I term neuro-psychic factors.

In the modern individual who can read and write these latter factors are four in number : the acoustic and the visual images of speech (impressive components), the kinæsthetic articulatory and the kinæsthetic graphic images (expressive components).

Which of all these neuro-psychic components of language is the most essential in the mechanism of speech? On this point all authorities are not in agreement. While Charcot and the writer have recognised the greatest formative and regulative factor of speech in the acoustic images, Stricker, Bastian and a few others accord the greatest value to the kinæsthetic articulatory image.

Stricker, who has given much attention to the psychology of language, has arrived at conclusions not quite tenable, owing to the fact that he has considered the mechanism of language in a too exclusive and one-sided manner. According to him, speech is the outward manifestation of the word itself represented as a motor image. He argues that when we say 'B' inwardly to ourselves, when all around is quiet, we feel something at our lips and tongue—a sensation of contraction, of movement, which is nothing else than the memory of the movement executed by us at other times in pronouncing the sound of the letter B, which leaves a mnemonic image, reproduced when we have to pronounce a like sound. The problem has not been set forth in all its bearing by Stricker, because, whilst setting too much value upon the motor or senso-motor image, he has underrated that of the other images of speech. When we think of a word—*e.g.*, 'love'—there is not reawakened, according to the doctrine of Stricker, the phonic or visual image—*i.e.*, the recollection of the word heard or read at a former time—but the sensation of the innervation transmitted to the tongue, lips, and the larynx, as if we pronounced that word in a low voice. What we really notice is the same impulse, which is irradiated to the peripheral organs of language, but differing in intensity; and sometimes, in thinking of the words, we can, by observing attentively, notice slight corresponding vibrations of the lips, the tongue, and the larynx.

Thus Stricker comes to the conclusion that articulate speech is entirely dependent upon the mnemonic reproduction of the motor image (kinæsthetic according to Bastian).

One cannot disregard the fact that the subjective method renders great service in the study of language; but one cannot exaggerate its value without running the risk of restricting one's self to an unnaturally limited range of observation. When we turn our attention and fix it too long on one sensation, one image, or one idea, this makes itself strongly felt, and by the same action all the others diminish in proportion. Thus it is that if we think of the kinæsthetic impressions which we receive in the act of pronouncing B, we perceive only these, or at least the great predominance of these over the others. We feel something which records the sensation produced by the organs of speech in the act of pronouncing the letter B; but that is not all, for the very simple reason that the verbal image is not the representation of one simple sensation, but the reproduction of many sensations closely associ-

ated. A simple representation can be received only abstractly. In fact, the moment I think of the letter B, there is reawakened in my mind the acoustic image, the visual image, and that of the movements of the lips and tongue, by virtue of which I pronounce the sound of that letter. Of this complexity of sensations there is reawakened in preference, in different individuals, now the kinæsthetic, now the auditory, or, again, the visual, according to the preponderating development and education of the senses in each, and according as the attention is fixed more intensely on one particular image than on the others. In my own case, in fact, I feel something at my lips, but have also the reawakening of the acoustic image of the sound of the letter or syllable and the visual image of the letter itself. Of these, however, I notice the muscular and tactile sensations less than the others.

Ideation consists in a co-ordination of sensory representations. The idea which the illiterate have of B is quite different from that of one who can read and write.

What we say of letters holds good also of words, seeing that words are only a collection of syllables and of letters. Let us take, *e.g.*, the word 'school.' According to Stricker, it would be the group of kinæsthetic images corresponding to the syllabic motor images that would determine the articulate sound. Accordingly, this would represent merely the reflex reproduction of a series of sensomuscular images. But it is clear that in wishing to reproduce, in imagination, the word 'school,' we reawaken not only the sensomuscular, but also the acoustic and visual image of that word, and, further, an infinity of verbal images and representations of rooms, gatherings, persons, notions, etc., closely associated with the emotions formerly experienced in childhood. Every one of these images evokes by itself, according to associative law, the word 'school' by reawakening the auditory and visual images of the word itself. The kinæsthetic is the least conscious, and that which has the least power of reproducing the word, although it may represent the ultimate and necessary instrument without which the utterance would not be possible. The word, then, is more than the mere reproduction of the muscular image, which has weaker reproductive power in comparison with the others, albeit it is closely allied with the visual and the acoustic images, which are simultaneously rearoused, and, I would say, almost fused with it.

The analysis of speech, which appears to be a functional unit, and is in reality a product of the coalescence of an immense number of functional units, which in their turn are the product of as true anatomical units scattered throughout the cortex of the brain, should lead us to suppose that all these anatomical and cortical units, and the groups of these, which work towards the formation of language, must be closely correlated by paths of communication and association. It is very natural, then, that interruption of

these paths, by breaking the communication between two or more groups of cortical units, must impede the formation of the complex product resulting directly from the combination of the elementary functional products of two or more groups, and give rise to simpler or altogether abnormal products. Thus it has come about, especially in these latter years, as the result of a work of delicate analysis, that the great importance of the paths of association has been brought into evidence, and another group of physiological factors of language has been distinguished, with a corresponding group of clinical figures differing from each other. I refer to the associative factors and the respective subcortical aphasic disturbances.

But such a work of association, whence results a product so complex as speech, is subject to fundamental laws, among which the most evident are : (1) The commanding preponderance of one component of language over all the others ; and (2) the individual varieties.

The preponderance of one component over the others, or, let us say, the government of the whole mechanism, is held by that factor which has been fundamentally the first in the evolution of language in the species, and is the first always in the evolution of language in the individual.

One can admit, with much probability, the hypothesis that the phonic or acoustic centre of articulate sounds is the first to be differentiated for the specific function of language in the cortical auditory area, and to me it seems evident that even in the infant the articulate sounds first emitted are only a fragment of more complex sounds which have already specialized some cortical units of the auditory centre. Everyone knows that a considerable time elapses before the infant is able to articulate a word whose phonic image has already been registered for a long time. There are set up by this means, not only relations between the phonic centre and the centre of articulation of the word, but likewise a kind of regulative influence exercised by the former upon the latter, which displays the nervous impulses in the form of articulate sounds, just as they have been formed under the projection of the acoustic image of the word. If this last should be awanting, or if, by interruption of the associative paths, the respective nervous impulses cannot reach the other group of cortical units where are generated and whence are emitted the kinæsthetic impulses that call into play the motor mechanism of speech, this will fail completely, or will be entirely changed and rendered unintelligible.

The phonic image exercises, likewise, a regulative power over the visual image of speech. The infant learns to read only when the phono-motor part of language is developed, and also functionally perfected. Visual images of letters, syllables, and words, can only be formed by moulding themselves to the phonic images, and also perhaps to the kinæsthetic. They will be re-evoked, then, only by

the former or by both together. This law possesses as great a value in the questions concerning the aphasias as in psychology.

The other law exhibits the individual varieties.

From this point of view, we must divide man into two categories. The first includes the illiterate, still very numerous amongst us, and the second embraces those who have learned to read and write. In the first category, the mechanism of language is by far the simpler. In the individuals comprising it, only the images of objects and abstract conceptions come into play, and these in their turn reawaken the respective phonetic images by determined paths, and these again the motor images, which resolve themselves into co-ordinate movements of the whole apparatus for the articulation of speech.

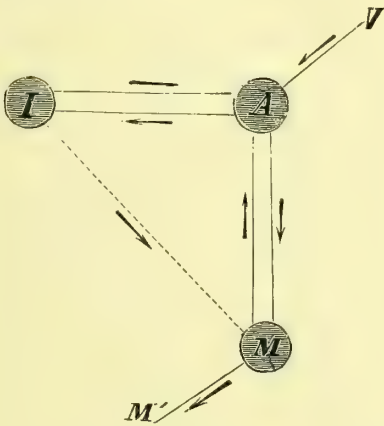


FIG. 46.

I, Image of the object ; A, verbal acoustic image ; M, motor image ; M', nervo-muscular apparatus for articulation ; V, centripetal paths for the formation of the verbal acoustic images.

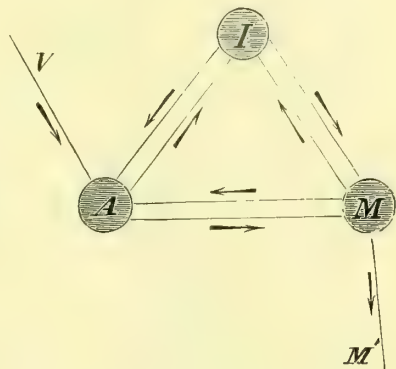


FIG. 47.

A, Acoustic verbal image ; M, motor image ; I, intellectual field ; IM, direct paths from the intellectual field to the centre of the kinæsthetic images of speech ; the rest as in Fig. 46.

Scheme of Language in the Illiterate.—The first scheme (Fig. 46) indicates the mechanism of speech in the individuals of this category.

In the second scheme (Fig. 47), the field of the intellect is also directly connected with the kinæsthetic centre ; this must be considered probable.

The acoustic image A is transmitted as a nerve wave, which arouses the correlative motor image in M, which, in its turn, transmits itself as the nerve wave MM'. The same verbal image A concurs in the formation of the conceptions, and reawakens what it expresses, or the images of the object to which it refers, by traversing the path AI. This happens when we listen to one speaking, or in the so-called expressive language. In expressive language, the nerve wave departs from I (conceptions and concrete images of objects), and while on one hand it puts M into a state of tension by

means of the path IM, it reawakens the acoustic image of the correlative word in A by means of the path IA, and it is the acoustic image which becomes transmitted along the path AM as a nerve wave to M, where it reawakens the kinæsthetic image of the word, which transforms itself into the articulated word by the path M'.

In the other, however, the mechanism becomes extremely complex, inasmuch as there are associated with those two, other two factors, which in individual cases assume different values.

Just as the study of embryology sheds an immense flood of

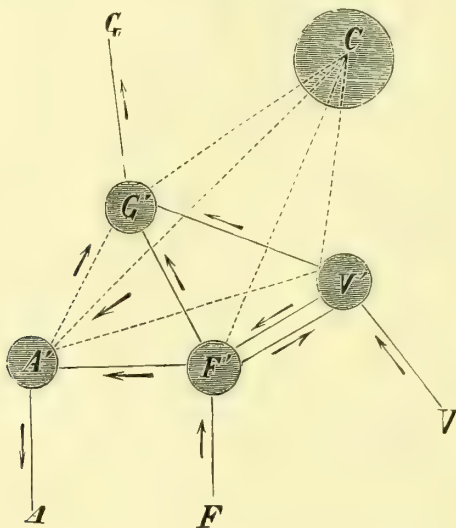


FIG. 48.—SCHEME OF THE MECHANISM OF LANGUAGE IN MEN WHO READ AND WRITE.

C, Field of the concrete images and of the conceptions; F', centre of the phonetic or acoustic images of speech; V', centre of the visual images; A', centre of the kinæsthetic articulatory images; G', centre of the kinæsthetic graphic images; FF' and VV', centripetal paths for the waves forming the respective sensory images; A'A and G'G, centrifugal subcortical paths for the waves expressive of spoken and written language; CV', CF', CA', CG', associative paths between the intellectual field and the respective verbal centres. (These paths must be considered as twofold, from the intellectual field to the verbal images and *vice versa*.) The other lines represent the associative paths between the different sensory and motor centres of speech.

light upon ordinary physiology and pathology, so does the study of the progressive development of language, considered in general or in single races, or in the infancy of each individual, shed an unexpected flood of light upon the physiology and pathology of language.

Let us follow the phases seen in the infant in its earliest education in reading and writing. The graphic symbols, the letters, the syllables, and the words, have their correlatives in the phonic symbols which the infant already knows when it is set to learn to read. There is established in consequence of the well-known scholastic methods a relation between the acoustic image and the visual image of speech, with a preponderance of the former over the

latter, because the graphic image has no signification in the infant, except such as is due to the phonic image. The association is so strict, and the relations between the two so intimate, that the visual image, being of later acquisition, can, in the majority of cases, with difficulty act by itself or be rearoused by itself under the influence of the concrete image of the object, unless with the aid of the phonic image, which is aroused simultaneously, if not first.

This explains the scanty power, in most individuals, of the visual image in the mechanism of language; what little it has is due to the phonic image. In other words, it is like the interlocking of two cogwheels.

But this rule does not always hold good. Heredity, education, business, and exercise, as well as certain other contingencies of life, can reinforce the visual images to such a degree that, in the evolution of speech, they assume a great predominance over the acoustic. In such a case a man speaks and writes, not with the acoustic images, now of secondary importance, but with the visual images. The internal diction, so well delineated by Stricker and Ballet, and which is so great a part of language, is more visual than acoustic. Hence the rational and happy distinction of men into aural (those who speak and write with the acoustic images of words) and visual (those who speak and write preferably with the visual images of words).

It is evident that the regulative power exercised by the acoustic images of words over all the others must be assumed in part by the visual when, through long exercise, these acquire that potency which, in persons who read much less, must belong to the auditory images. It is likewise clear that the complex symptomatology of any disorder of speech whatever must exhibit notable differences according as the regulative power is exercised by one or other of the two groups of cortical units whence are derived the physiological factors of language of which we have spoken above. We can picture to ourselves language as a constellation, a planetary system, formed by one star of greater magnitude and a number of smaller ones whose movements are regulated by the centre of the sidereal system, with this difference—that in different individuals minor stars assume different grandeur, the visual in particular tending to become the centre of the system.

The articulation of a word on the part of a visual individual brings into action (1) the phonetic centre, where are rearoused the acoustic images of letters and words, possibly distinct; (2) the visual centre, where the visual graphic images of single letters and of concrete words are reawakened; (3) the kinæsthetic articulatory centre, where are reawakened the kinæsthetic images—that is to say, the tactile and muscular images of all the movements necessary for the pronunciation of the letters and syllables of the word—and,

if this is committed into writing, (4) the kinæsthetic graphic centre (register of the tactile and muscular images occurring in the movements of writing the letters and syllables constituting the word), not admitted by any other.

The system once constituted and the dynamic relations between the various components being established, it is clear that the disappearance of one of them must induce a disorientation in the motion and direction of all the others. It is clear, also, that the greater the regulative power which the one exercises over the others, the greater will be the disorder. The suppression of the acoustic image F' in the majority of individuals induces also inhibition of the reproduction of the visual image, the kinæsthetic articulatory image, and the kinæsthetic graphic image of the word. The disappearance of the visual image must result in the functional incapacity of the kinæsthetic graphic centre of the word, and hence the inability to reproduce, in writing, the graphic image of the same, for the very simple reason that the graphic centre functionates under the more immediate control of the visual image of the word, which it exhibits in sensible form. Often, however, it induces also a functional disorientation of the phonic centre of speech, habituated as it is to functionate in concert with the visual, and also a significant disorientation of the kinæsthetic centres of articulation, the greater the higher the degree of evolution reached by the visual word centre.

Functional Solidarity and Individual Specificity of the Different Neuro-psychic Factors of Language.—The complexity of the disorder brought to light by delicate investigation, no matter what may be the centre destroyed, phonic, visual, or kinæsthetic articulatory, along with the progressive restriction of the number of simple disorders of language, if partly the necessary consequence of the law of solidarity among the various factors of language, does not detract from any of them that individuality which is conferred on each by the specific nature of its own functional product.

According to some, there do not exist true centres of auditory, visual, and motor images of speech. Those we have considered as such are only circumscribed regions of the auditory or visual zone which are connected with the motor centre of language. The auditory and visual word images, as all the others, would be fixed, not by the centres of reception, but in other sites (Sollier).

The destruction of these other centres, which, after all, would be, according to this idea, associative centres, produces word deafness and word blindness, because in this case we are dealing with destruction not of the centres of the images, but of the centres for the transmission of vibrations, which determine a particular molecular state corresponding to the internal or external excitation.

The reproduction of the images of memory would occur through the medium of the motor or sensory functional centres. Such is

the theory held by Sollier. It has as many obscure points as there are points associated with language, and it is but a slight modification of the doctrine of Flechsig. We shall return to it again in the chapter on disturbances of perception and memory.

We already know the probable limits of the sensory and motor areas on the cortex of the cerebrum. It remains now to deal with the topography of the centres of the sensory and motor images of speech. The essential fact is that these areas are found on the periphery of the respective sensory and motor zones, and as the office they fulfil represents a stage of functional evolution with respect to the general function, I have for some time termed them the *zones of evolution*. If we consider the cerebral mantle in relation to its phylogeny and ontogeny—functional and perhaps also anatomical—we find that each sensory or motor area is separated from its neighbour by an intermediary zone to which we can assign a function higher and more complex, in so far as it reflects formation and manifestation of thought. These intermediary zones are the areas specially concerned in language. One is found in the general auditory sphere, another at the limits of the general visual sphere, one or two others between the motor area properly so-called and the prefrontal lobe, a zone of evolution of the motor area. The conception of an area of evolution arises from the fact that the angular gyrus and the supramarginal convolution in the illiterate—granted that to this area is relegated the formation and preservation of the visual images of the letters and words by which one learns to read—represent a neutral zone, or, as one might say, a blank register on whose pages, through circumstances of life, the individual has written nothing. It necessarily follows that destruction of this area does not occasion the suppression of any function, or diminish in any way the intellectual capital of him who is thereby deprived of it. Now, when it is borne in mind that the optic area, or field of cortical projection of the retina, comprises the calcarine fissure, part of the lingual and fusiform lobules, and the occipital pole, and that the external aspect of the occipital lobe is the probable seat of concrete visual images of objects and perhaps also of places, and that it must be more or less occupied in different individuals according to the opportunities they have had by education and vocation of recording a greater or less number of impressions, it will on all hands be admitted that the rest of the visual area is a zone of evolution, a blank register for recording images of a higher value, with a particular education, enormously augmenting the intellectual capital, versatility, and influence of the individual in his social relations. The fact is that lesions of this zone in the illiterate, if they extend in depth as far as the radiations of Gratiolet, induce only bilateral homonymous hemianopsia, and perhaps some disturbance in the associative process, through interruption of other paths of association between distant cortical regions; while in

those who have learned to read the same lesions produce also loss of reading. Furthermore, as every new and high function of the cerebrum, and especially that of language, plays an important part in the process of thought and in the government of psychic life, the destruction of that same area of language, whose function would be highly developed, will, in consequence, cause also a more or less serious disturbance of the process of thought.

What I have said of the visual area of language holds good also of the others. The law is similar, the only difference being in the period of development of each area, and, in consequence, the importance, as regards the mechanism of speech, which is to be attributed to each in the history of the individual development.

The auditory area or register of the acoustic word images is found in the middle and posterior parts of the first temporal convolution, and perhaps also of the second.

The motor area of articulate speech, the field of formation and registration of the kinæsthetic images of articulate speech, is found at the base of the third frontal convolution, the so-called centre of Broca—strictly speaking, that part of the base which is embraced between the vertical and anterior horizontal branches of the fissure of Sylvius.

The motor area of written speech or register of the kinæsthetic images of writing would occupy the base of the second frontal convolution. As is well shown in the figure, the two sensory areas of speech—the auditory and the visual—are found each to form a part of the corresponding visual and auditory sensory areas, each being a continuation of the respective general areas.

The motor areas of speech are situated each in continuation with the respective general motor areas; that of articulate speech near the area for the movements of the face, jaw, tongue, larynx, etc.; that of written speech near the area for the movements of the arm, wrists, hand, and fingers (fronto-Rolandic evolutive area).

This manner of viewing the topography of the areas of language appears to be truer and more rational than the other, which considers language as a function of the convolutions of the fissure of Sylvius.

It is known that in the first instance Charcot, and, after him, Freund, located the centres of language on the convolution bounding the fissure of Sylvius above, behind, and below. To this region Freund gave the name of 'the zone of language,' but it would appear rather circumscribed behind, above, and below, with respect to the entire boundary-line of the Sylvian fossa, and to the great distance which divides that zone from the motor area of articulate speech. But Miralliè and Dejerine would also justify the denomination on the ground that in the subcortical substance of the opercular tract, which would have nothing to do with language, associative fibres

would pass between the different centres—above all, between the sensory centres and the motor centre of speech.

Apart from the fact that these paths are by no means demonstrated in the opercular tract, I do not attach any importance to the belief that such centres may be situated around the fissure of Sylvius, or that they are all nourished by the Sylvian artery. When we consider that, for the reasons above stated, there in all probability exists a centre for the movements of writing at the base of the second frontal convolution; that, in the illiterate, the supra-marginal convolution and the angular gyrus are of little account in physiology and pathology; that the associative paths from the visual to the motor zone are represented, not by a compact bundle in the subopercular substance, but by paths scattered over a large

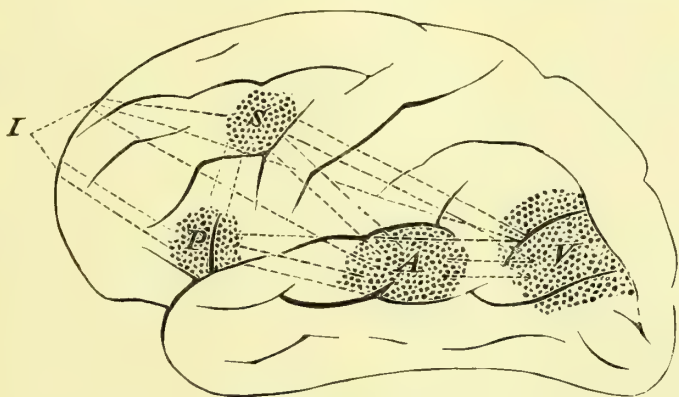


FIG. 49.—TOPOGRAPHY OF THE ZONE OF THE NEURO-PSYCHIC FACTORS OF LANGUAGE.

A, Acoustic zone; V, visual zone; P, motor zone for spoken language; S, presumed motor zone for writing; I, intellectual field, which in the scheme is represented only by the frontal lobe, but comprises all the sensory zones, whose reciprocal relations with the field of speech have been suppressed so as not to complicate the figure to such an extent as to render it less intelligible.

fronto-parieto-occipital surface; that the paths between the auditory and the motor areas of language, apart from the insula, can only be those of the capsula extrema and capsula externa; and also that the associative paths between the intellectual field and the field of the neuro-psychic factors of speech form a part of the zone of language, no one can attach importance to the statement that the Sylvian region is the sole zone of language, more especially as such a tendency to restrict within very narrow limits very wide functions cannot but be dangerous, as much to the scientific conception of the function itself as to the anatomical diagnosis of the various forms of aphasia.

Figure 49 shows clearly how the various centres of speech are related to one another, so as to exchange their respective products according to the laws previously alluded to, and sets forth their

connection at the same time with the intellectual field. The motor centres for language are dependent on the sensory centres, because in the majority of cases it is the sensory images, auditory and visual, which put the motor centres in action, while at the same time they are in relation with the intellectual field, which, on the other hand, gives the re-evocative impulse to the sensory centres *A* and *V*. Pitres, on the other hand, holds that the idea evokes speech directly, without the intervention of the sensory centres. It is an opinion which one cannot absolutely contradict, and if a distinct field for the intelligence in direct relation with the motor centres be admitted—while one holds that most people are motor-phonetic rather than auditory and visual—then there can be no difficulty in believing that the idea awakens the word directly in *P*. I am not averse to sharing a similar opinion; but one must agree that the function is very complex, and that the scheme gives but a very faint idea of it. It would certainly be difficult, by accepting unconditionally such a view, to explain the paraphasia resulting from a lesion of *A*, or of the associative fibres *AP*, with *P* quite normal and in regular relation with *I*.

All the fore-mentioned centres of language are found, in the majority of cases, in the left hemisphere. The right cerebrum, however, is in some the seat of the functions of language, inasmuch as it is also the seat of the more specialized volitional centres, as in left-handed people. Right-handed individuals always speak from the left hemisphere, while left-handed speak from the right. The latter form an exception to the general rule. Preobraschenski, to give an example, has recently published the case of a left-handed individual with left hemiplegia and motor aphasia due to a gross lesion in the right hemisphere. The right hemisphere assists but little in the function of language, symbolic, spoken, or written. It, however, bulks more largely in emotional language. Later on it may possibly acquire importance in those who, from disease of the left hemisphere, have lost the function of language.

As the centres of the right and the left hemispheres are homologous and in communication with each other, it is easy to understand how, under some circumstances, particularly in children, these functions, which by heredity are usually differentiated on the left hemisphere, become specialized on the right. The hypothesis of the education of the right hemisphere to the function of language is accepted, however, with reserve, because the re-education of the aphasics is also due in some measure to the parts near the destructive focus, seeing that the respective centres, which are seldom completely destroyed, are not definitely delimited from the neighbouring areas, but are surrounded by an evolutive zone which, if spared, can, in part at least, take up the function of the region destroyed.

Compensations in general—and in the particular case of language they are not very infrequent—can be attributed, on the one hand,

to the development of the function in the evolutive zone, or in that part of the centre itself which is spared, and, on the other hand, to the function of homologous areas of the right hemisphere by their consequently increased specialization.

I will mention but briefly the already much-discussed question why the left hemisphere is the centre for articulate speech, while volitional movements are fulfilled by both hemispheres. The more generally-accepted hypothesis is that of H. Jackson. Seeing that the right side of the body, through atavism and through individual education, is that which is most generally employed, it is clear that the left hemisphere acquires a significant preponderance over the right in all motor functions, and possibly too in psychic. Language is the highest expression of this preponderance of the left hemisphere. Whether the particular mode of origin of the left carotid artery determines in advance the development of the left cerebral hemisphere as compared with the right is a question which cannot be conclusively answered; it is affirmed by Ogle and by Gratiolet, and negatived by Vogt and Ecker. To me, however, the preponderance in weight of the left hemisphere, in relation to its psycholinguistic function, appears to be an indisputable fact.

When the child accompanies its first articulate sounds with a gesture of the right hand, it engraves on the left hemisphere the first association between the word spoken and the movements of the right upper limb. We work, write, practise self-defence, etc., with the right upper limb, and as this limb acts oftener and more efficiently than the left, hence also the left hemisphere must functionate more frequently and to better purpose than the right. This functional development must also produce great anatomical growth of the left hemisphere, and it is to this same agency that the particular localization of speech in the left hemisphere is due.* For those learning to read, the committal to paper, in graphic symbols with the right hand, of labial and syllabic sounds spoken in a loud or clear voice, as is often the case with infants, is not without importance. The right hemisphere, however, is not altogether denied a part in the function of language, but plays rather an important part in the execution of the first articulate sounds of the infant, a period in which language is more emotional.

Kussmaul, Bastian, Wyllie, and H. Jackson agree as to the part taken by the right hemisphere in the formation and exposition of language.

As differentiation of ideas and their connections with words progress, the left hemisphere increases in activity, while the right lags behind.

The majority of men speak with the left hemisphere. Seguin's collection of 17 aphasics with left hemiplegia, contrasted with

* The greater weight of the left hemisphere has for a long time been demonstrated by Bastian, Turner, Nicolucci, and others.

240 aphasics with right hemiplegia, corresponds to little more than the proportion of left-handed individuals which Ogle found in 2,000 ordinary patients examined by him in this connection. Notwithstanding, the right hemisphere, as we have already seen, is not altogether devoid of the mechanism of language, to which it gives its contribution. I maintain that, as regards speech, the right hemisphere is as yet in an elementary stage of development as compared with the left.

Thus it is that aphasics can utter incomplete and odd words as well as some monosyllables, which all have noted, and can speak the interjectional, primitive form of language. Does the right hemisphere co-operate in the articulation of these organized sounds, such as oaths and the commoner words, 'yes' and 'no'? That it does is the opinion which, as I have already said, is most accepted. In fact, in the literature of the subject there are recorded cases which indicate that the aphasia is more pronounced when the lesions are bilateral. Thus Vernet's patient, who on the left side had only a hæmorrhagic focus in the insula, was completely aphasic, a point which can only be explained by the existence of another focus on the right side affecting the foot of the third frontal convolution. The actual facts are that left-handed individuals become aphasic through destructive foci, not in the left, but in the right hemisphere (Wadham's and Habershon's cases); further, that lesions of the zone of language on the left side do not produce aphasia in left-handed individuals (cases recorded by Taylor, Foulis, Westphal, Wolland, Bianchi, and Seppilli); and that between the centres of speech in the left and the homonymous parts in the right hemisphere there exist commissural fibres.

From what we have thus far discovered it is clear that perception, which furnishes all the elements necessary for the cognition of objects falling under the senses, cannot be considered as the result of a physiological process of a simple nature or of processes simply successive in time and space. It is rather the complex and co-ordinate resultant of many processes of different character, successive, and extended over the cerebral surface. For the visual perception of an object we now recognise that there are requisite, as before stated—(1) a luminous stimulus, which is transformed into a luminous sensation; (2) a series of movements, the execution of which fixes in the corresponding centre the features of form, extent, and special relations; (3) the fusion of these two factors, whence is derived the objective unity which gives to the perceptive centres the image of the object. Even although there should be no morphological difference between the elements furnishing these various physiological components of vision, no one would care to deny that these elementary factors differ from one another, and that

hence they may come into action at different points and in different nervous elements.

What we have said of the visual zone and visual perception can be attributed to all the other senses and to their respective cortical areas. In the vicinity of the auditory zone is the motor centre for the auricles, and the auditory centre must also be in relation with the motor zone of the head and eyes. In relation with the olfactory area are (1) the centre whose excitation induces movements of the nares, and (2) the respiratory centre. We ought to consider the centres of the jaw and of mastication as forming part of the gustatory area.

It follows from the results of experiments that we should assign a very extensive area to the visual function, and distinguish it into regions set apart for mere elementary functions, and one region in which the elementary components would be co-ordinated (or associated) and fused, in order to give a more complex perceptive product, which is that of the concrete images of objects.

The idea of the existence of associative zones had been clearly expressed by me eighteen years ago, on an experimental basis, in confirmation of the hypothesis of Broadbent, which had been known for several years previously. To Flechsig, however, we owe the confirmation and development of this conception, which, having its primary origin in experimental observation (although he seems to ignore this fact), yet seemed to him capable of being laid down as a proposition on purely anatomical grounds. According to Flechsig, the cerebral mantle is in relation with the receptive and emissive organs by one part only. This part in its entirety is constituted by the so-called sensory and motor cortical centres, which receive fibres of projection from the sensory organs, and give origin to centrifugal fibres for the motor apparatus. There are consequently two systems of fibres of projection, centripetal and centrifugal. By means of the receptive system the brain receives and transforms the external energies into psychic energy; by the emissive system it reacts with psychic energy upon the external world. This area, possessing the most direct relations with the periphery, does not much exceed the third of the entire surface of the cortex, according to the original calculations of Flechsig. All the rest of the cerebral mantle, more than the half of its surface, though possessing scattered fibres of projection—according to Flechsig's more recent researches, with which he seeks in a manner to correct his previous results—has not such numerous and direct relations with the periphery of the body, but has an indirect relation by means of the areas previously indicated, and it is divided into regions to which Flechsig has given the name of *associative areas*. These are the areas that elaborate the products of function of the receptive areas and furnish products of higher psychic value such as result from the physiological fusion of a certain number of simpler psychic products.

The method of black coloration used by Flechsig has enabled him to distinguish the first areas, which I call receptive, from the second, which he calls associative. The former receive fibres which become myelinated some time before the fibres of the second system, which are myelinated more slowly and progressively from the periphery of the receptive zones to the terminal zone, as he calls it, of the associative area. The nerve fibres with late myelination come from the receptive zones, a fact which allows us to deduce, with the greatest probability, that in the areas called associative the products of work of the receptive areas or areas of projection become elaborated. According to Flechsig, the associative

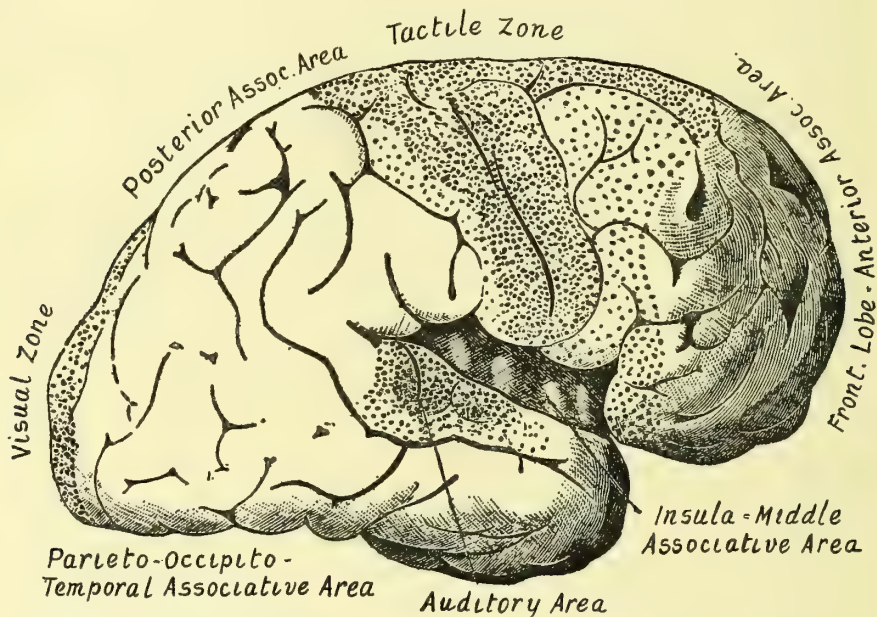


FIG. 50.—DISTRIBUTION OF THE AREAS OF PROJECTION AND ASSOCIATION, ACCORDING TO FLECHSIG.: EXTERNAL ASPECT.

areas on the external aspect of the hemisphere would be three in number: (1) The anterior or frontal, situated in front of the motor zone, or, as he calls it, the *tactile zone*, and comprising the prefrontal lobe; (2) the middle, much smaller, is formed by the insula, situated between the frontal lobe, the olfactory, the somæsthetic, and the auditory zones; (3) the large posterior or parieto-occipital associative zone, rather larger than the two preceding, comprising an extensive surface, limited in front and above by the somæsthetic zone; in front, below, and above (on the internal aspect) by the insula, the auditory and the olfactory zone (according to some by the gustatory as well); behind by the optic zone; below, it is continued on the inferior aspect of the hemisphere as far as the hippocampus.

In a succeeding publication (*Neue Untersuchungen ueber die Markbildung in den menschlichen Grosshirnlappen — Neurolog. Centralbl.*, 1898), Flechsig had to recognise from the results of his researches, carried out with the method before mentioned, and with the view of discovering the moment of appearance of myelination of the intrahemispheric nerve fibres during the development of the brain in intra- and extra-uterine life, a much greater number of special zones, designated by him 'embryological cortical territories.' He distinguishes forty of them, and believes that this number is not exhaustive. Such a large number of cortical territories is dis-

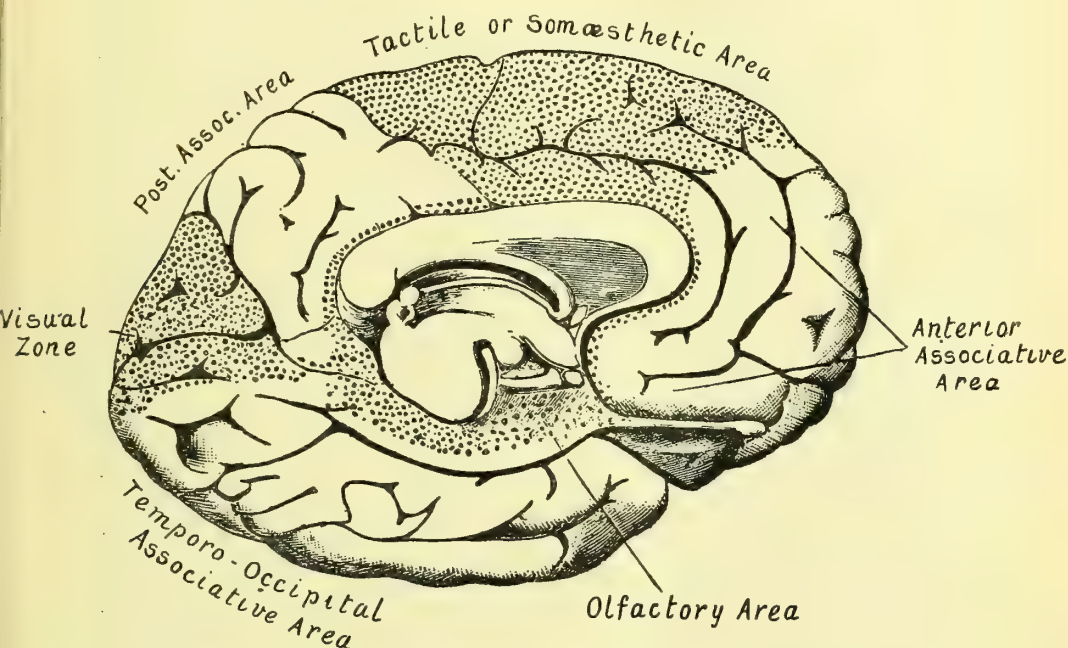


FIG. 51.—DISTRIBUTION OF THE AREAS OF PROJECTION AND ASSOCIATION, ACCORDING TO FLECHSIG: INNER ASPECT.

tributed in three groups: (1) *Primordial territories*, which are normally formed before the foetus reaches maturity (from Nos. 1 to 8 of his system); (2) *intermediate territories*, the fibres of which become myelinated up to one month after parturition at term (from 9 to 32); and (3) *terminal territories*, the fibres of which are maturing from one to four months after birth (from 33 to 40).

The physiological signification of the given associative areas is not easy to define. The author assigns to his anatomical researches a much wider signification than they really merit, giving, as he does, to his system the appearance of a structure reared upon the sound and stable foundation of anatomy. It is evident, however, that cortical psycho-physiology incurs a danger if we trust to suggestive anatomical inquiries on the too exclusive method adopted by

Flechsig, who, in point of fact, is contradicted by Vogt, who has been unable to confirm the postulates of Flechsig as regards either the chronological or the topographical order of the myeline investment of the nerve fibres.

The anatomical connection between the various centres of sensibility in the cortex would take place through the medium of the centres of association, and more particularly through that of their marginal zones, by means of the arcuate fibres. The centres of association, in other words, would have the task of associating and reproducing the states of excitation of the different spheres of sensibility, indirectly uniting these spheres with one another, by means of the system of fibres of association.

The more feasible deduction which, though not exactly formulated, one can read between the lines of the different communications on this subject by Flechsig is that each embryological cortical territory of all three groups possesses distinct physiological features of its own, and one must come to the conclusion that the forty territories, which for some time hence will be increased in number, serve for correspondingly specific activities of the mind.

When one considers such an important anatomical and physiological problem without prejudice and intolerance of mind, such as emanate from the publications of Flechsig, the first question—in itself very elementary—that presents itself to the mind is the following: Does the myelination of the intrahemispheric fibres always obey a constant law; and, if so, does it follow as an unfailing corollary that this topography of evolutive anatomy should be retained as a foundation and support of a kind of psychological topography? Indeed, there is nothing to prevent us, judging from the modifications made by Flechsig himself in his original scheme, concluding that the maturing of the intrahemispheric fibres does not follow a law so constant in its details as to justify the new cortical topography. This is in the way of being proved, as I have already recorded. In this case the intermediate and terminal territories would not possess specific mental activities in the sense of Flechsig, but with their maturity there would coincide, at the most, the evolutionary extension of a function already represented in the neighbouring territories, and one might then maintain that each forms a part of the respective sensory or primordial territory, of which it would represent only an evolutionary extension. In other words, we may logically suppose that what Flechsig regards as associative areas are only perceptive areas progressively more evolved, with the exception of the anterior, which we will deal with specially. This leads us to admit zones of evolution towards the limits of each sensory or perceptive area.

On the other hand, it is well to mention that it is neither proved nor probable that centres of memory exist in the cerebral cortex

distinct from those we call perceptive centres. If we support the uniformity of the anatomical substratum of the perceptions and of the images commemorative of past perceptions—that is to say, of the images of objects which have stimulated the senses—we arrive at the inference that the perceptive zone is only the zone of the memory of past perceptions. I have already pointed out that we must give a more rational interpretation to the perceptive process.

The undisputed fact of the association of different images for the formation of complex images and general ideas obliges us to admit the continuous movement of such products from the sites of formation to the points of rendezvous; but, with the exception of the frontal lobe, to which, as we shall see a little further on, we must attribute this power of synthesis, it becomes arbitrary to affirm that the centre of memory of past perceptions is distinct from the centre of perception (we shall examine this question in greater detail in the chapter upon memory), as does Flechsig, who assigns the task of associating the different images to the parieto-temporo-occipital zone. If this last were distinct from the perceptive zone, and there were situated in it, placed as it is in front of the visual perceptive zone, the so-called associative one which, according to Flechsig, would be the meeting-point of the perceptions already registered and those freshly furnished by the sensory zones, in which would reside the process of recognition and classification of the perceptions themselves; if in such a zone there could come together, not only the past visual perceptions, but the auditory, the olfactory, and the tactile, with which series of psychic compounds of a higher order might be formed, the hypothesis of Flechsig with regard to that zone would be more intelligible and more probable; but this extensive surface of the brain is almost quite appropriated by the visual function. At several points of it electric excitation produces ocular movements; destruction, or partial destruction, if it is cortical only, provokes transient visual disturbances; if it is deep, it produces permanent hemiopia; if it is bilateral, psychic blindness, in which case objects seen are no longer recognised.

This fact may be explained as due to failure of the anatomical substratum of the previously registered visual images, whose mnemonic reawakening is necessary as the standard of comparison for their recognition, and to the concomitant failure of the conditions requisite for formation and registration of images seen for the first time. Further, the anterior terminal extremity of the given area is in man exclusively visual, inasmuch as it is destined for a function hierarchically higher, namely that of reading—that is to say, the function through which the visual images of the graphic symbols of the words denominating the objects seen are formed and registered. The components of the visual graphic images are much more numerous compared with those of the visual images of the objects

themselves, and therefore the given zone, physiologically viewed, has a much higher value, and must be considered more fully evolved, yet of a visual nature. Hence all this large zone called by Flechsig 'associative' is, after all, only a region of the cortex set apart exclusively for the visual function in all its gradations, from the simplest to the most complex. And the rule would be that the function is evolved from simple luminous perceptions in the region of the calcarine fissure, the cuneus, and the occipital pole, with the aid of the motor elements of the eyes, to the formation of the images of objects in the cortex of the external occipito-parietal aspect, and, finally, with this last psychic product, now fairly complex, it becomes still further evolved up to the formation of the visual graphic

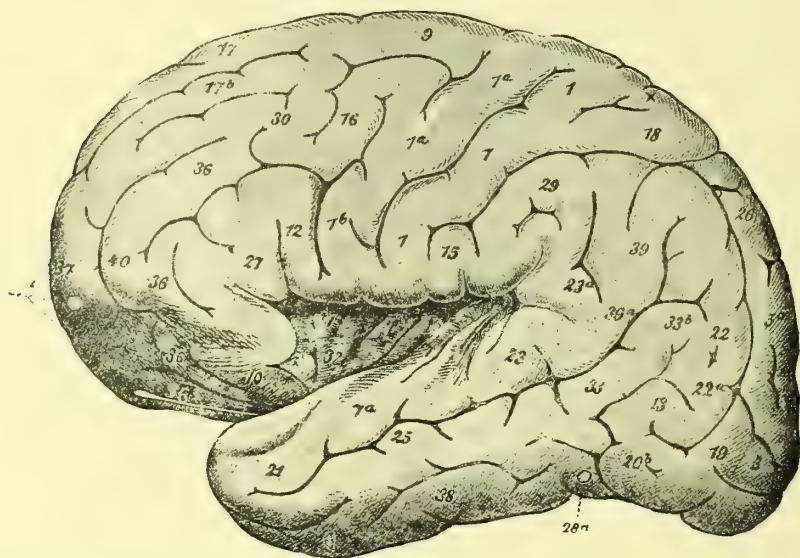


FIG. 52.—DISTRIBUTION OF THE PRIMORDIAL, INTERMEDIATE AND TERMINAL TERRITORIES, ACCORDING TO THE MOST RECENT RESEARCHES OF FLECHSIG: EXTERNAL ASPECT.

symbols of the objects themselves and their relations in the region of the anterior limits of the given zone. There is nothing to warrant the consideration of this extensive cortical region as the anatomical substratum of the highest intellectual processes, consisting of the association of images furnished by the different perceptive or sensory areas, because no clinical observation as yet published favours such a hypothesis. If bilateral lesions of the given zone produce, besides psychic blindness for objects, a more or less marked condition of dementia, a fact which Flechsig adduces in support of his theory, it is legitimate to suppose that the dementia in such cases is the expression of the loss of a large part of the intellectual capital of the individual, depending on the destruction of the records of the visual images of the external world, which constitute the greatest

contingent of the whole sum of the sensory psychic components of the human intelligence. Hence the statement that excitation of the sensory zone gives as the result hallucination, while that of the associative zone, with which we are concerned, induces mental confusion, still demands the approbation of facts and anatomo-pathological proofs which cannot possibly be drawn from the objective examination of our existing data, and it ought therefore to be held as inconclusive. It is sufficient to recollect that, in nearly every case, hallucinations, when they arise acutely, induce states of dementia (mental confusion, amentia) more or less marked, and that not infrequently there are cases in which a single visual or auditory hallucination profoundly disturbs the psychic personality, even to

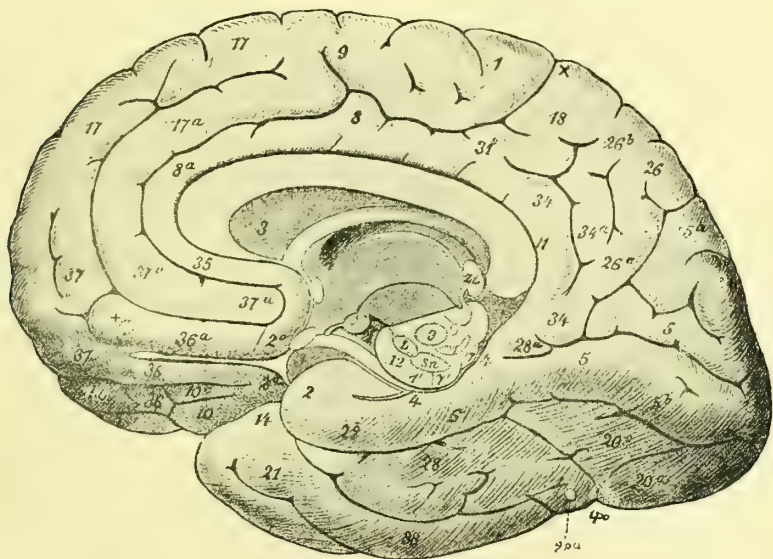


FIG. 53.—DISTRIBUTION OF THE PRIMORDIAL, INTERMEDIATE AND TERMINAL TERRITORIES, ACCORDING TO THE MOST RECENT RESEARCHES OF FLECHSIG: INNER ASPECT.

the production of intense mental confusion and sometimes of true stuporose conditions. These facts give to the hypothesis of Flechzig the value that it merits, rather different, certainly, from what its author would assign to it.

Histological analysis brings no aid to the doctrine of the associative areas as understood in the sense of Flechsig. We ought to meet with simplicity of structure in the sensory area, as compared with the structure of the associative areas. But the histological data so far collected do not warrant such a conclusion. We know that the occipital lobe, even from the now old researches of Meynert, has always shown a structure still more complex (seven layers instead of the five which the motor zone would have). The greater structural complexity of the visual zone has been lately

confirmed by Ramon y Cajal (*Estudios sobre la corteza cerebral humana—Rivista trimestral micrografica*, 1899), who has recognised new layers. Thus far nothing has been discovered to demonstrate such a difference of structure between the cell components of the sensory and associative zones as would account for the great difference in function that we find in the two types. It is true that so distinguished a histologist as Ramon y Cajal declared in the work just cited that the microscopic sections of the various sensory, motor, and *associative* zones of the cerebral cortex can be distinguished at a glance of the eye. It is true, also, that the most recent researches of the same Cajal, of Hammarberg (*Studien ueber Klinik und Pathologie der Idiotie*, Upsala, 1895), and of Schlapp (*Der Zellenbau der Grosshirnrinde des Affen Macacus Gynomolgus—Arch. f. Psychiatrie*, Bd. 30), always tend to further differentiate the structure of the various cortical zones. Apart from the fact, however, that we are very far from having a secure notion of the histological differences, as Hitzig justly mentioned, drawing his argument from the researches of Kölliker and Siemerling, who have been unable to confirm the existence of morphological differences between the different cortical territories, it is simply arbitrary to assign to those structural dissimilarities difference in function in the sense of Flechsig, who attributes a higher intellectual value to the posterior associative zone. Such a conception is disproved, also, by another fact—viz., by the marked dementia found in individuals suffering from word-deafness due to a destructive focus in the first temporal convolution. As is known, this part of the zone of language is included in the limits of the auditory or perceptive sensory area by the same Flechsig (primordial territory, No. 7, and in part of the intermediate territory, No. 23). It is impossible on the known facts to assign distinct areas to the function of generic audition and that of verbal audition in particular. It appears, rather, that the two functions are located in the same area, with marked predominance, on the left side, of the specific function of language (audition and registration of words spoken by others) as compared with the general function of hearing.

In this case we find a specific function of high intellectual value, located in the primordial and intermediate area, and it is easy to understand which and how many psychic and sensory components enter into the formation of the acoustic verbal images, which synthesize not only the auditory or phonic components of speech, but also the numerous and complex series of visual, tactile, and muscular images, and those of all the other senses, in so far as they refer to the object portrayed and made capable of recognition in all its attributes by the word. In my opinion few regions of the cerebral mantle have such numerous and extensive relations with the rest of the brain, and are so intimately bound up with the formation of thought and with all the workings of the mind, as the first

temporal convolution on the left side. In this region the thoughts assume their moulded form in speech, which tends always to portray more clearly the individual components and their synthesis, besides all the changes which occur from the incessant alternation of numberless external and internal stimuli. This region, however, is represented by Flechsig as a primordial and intermediate perceptive zone, and thus would have, according to the fundamental condition of this author, less importance than his great parieto-occipital associative zone.

The fact, which I have very frequently noted (*Il Policlinico*, 1894), of the existence of marked dementia associated with word-deafness does not go in favour of the above hypothesis, which in these cases is upheld only by the impossibility of associating in the cortex the sensory impressions acquired through the hearing, and points therefore to a disturbance of the faculty of co-ordination; on the contrary, in my opinion, it is dependent on a true loss of image-records, of which each sensory and perceptive area is creative and preservative. We do not agree with the hypothesis of those, among whom is Hitzig, who regard the cerebral mantle as the organ of consciousness, and consider that the images are formed in the subcortical ganglia, becoming conscious when they are projected upon the cerebral cortex—that is to say, upon the consciousness. To my thinking, the subcortical ganglia merely prepare the nerve wave, which comes to them from the periphery, or any of the components, for the formation of the image, which is ultimately perfected in the cortex only, either by the intrinsic mechanism of the more perfect anatomical constituents of the cortex or by the possibility of different psycho-physiological components meeting with one another, and hence giving rise to physiological fusion, rendered possible by the relations subsisting between the histological components. The state of consciousness is in proportion to the number of histological components with which the image, formed in the cortex, enters into relation.

We come now to the motor zone. In so far as one wishes to consider it a zone of projection it is easy to understand that there should arrive at it all the nerve waves from the various sensory zones and from the somæsthetic zone itself, which—unless we accept the ideas of Hitzig and Flechsig, who regard the motor zone as sensory (tactile zone), that is to say, a cortical zone of projection of the movements completed—if it does not coincide exactly with the motor zone, at least surrounds it in part. Such anatomical connections render possible the reactive relations with the external world. It is to the cortex of the brain what the anterior cornua of the spinal medulla are to the sensory paths, or rather to the posterior cornua; what the gray motor masses of the corpora quadrigemina are to the nuclei of origin of the acoustic nerves and to the optic paths. In each case

centripetal waves traverse the motor centres, and then exert their influence on the muscular apparatus. There vary only the grade, the worth, and the number of the components; the function is the same, and it is governed by the universal law of the reflexes. In proportion as we ascend in the spinal medulla the reflexes assume features of greater complexity, on account of the fact that a greater number of factors enter into its production, till it becomes a conscious psychic fact of the highest value.

In order that the reflex may occur it is necessary that all the products resulting in the individual zones of the cerebral cortex act upon the motor zone. In this way it reflects on the external world the number and character of the psycho-sensory products which excite it, singly or in association. In consequence of our perceptions we execute quite an infinite series of movements—movements of approximation and movements of withdrawal, according as the object causing the movement gives rise to pleasure or pain. If this is the functional mechanism, the so-called motor zone can only be an associative zone, and this more so than the large postero-inferior associative zone of Flechsig, because it utilizes the product of all the sensory zones situated behind and below. It is always the first to be myelinated, and is identified with the No. 1 of Flechsig's scheme. Evidently, the fibres which are first myelinated are only a small portion of those which arrive at the motor zone, and if, in course of development, many others reach it from all parts of the brain, what value remains in the distinction between zone of projection and associative zone?

In front of the motor zone, as though forming part of it, is another, embracing the base of the frontal convolutions, which, according to almost all authorities (from Boyer and Pitres onwards), forms an integral part of the motor zone. In my opinion it is an area of evolution of the motor zone, and, if we accept the observations so far made, the middle part of this strip becomes the field of extension of the motor zone of the upper limb for the complex movements involved in special occupations—*e.g.*, writing. In fact, a new, intense, and prolonged work must induce not only a perfecting of the primitive function, but also a greater extension of the functioning surface of the cortex. Notwithstanding all the doubts expressed, especially by Dejerine and Miralliè (*L'Aphasie Sensorielle*, Paris, 1896), concerning the existence of a centre for writing, there stands the very probable fact that writing, exercised for a long time—I would say automatism in writing with the right hand—must develop a centre or cortical area adapted for a particular co-ordination of movements, distinct from the centre of the more common movements of the upper limb—*viz.*, those of prehension, acts of defence, and the coarser handicrafts directed towards self-preservation.

As much may be said of the base of the third frontal convolution (apart from the difference in function between the two hemispheres

in this matter), which is the motor zone of spoken language, and is situated immediately in front of the motor zone for movements of an inferior order—viz., those of the lips, face, tongue, larynx, etc.—in fact, of those same muscular groups that are concerned in the articulation of speech. I advance the hypothesis that the centre of writing, about which there are so many controversies, is to that of the movements of the arm (for prehension and defence) as the centre of articulate speech is to those of mastication, phonation, facial movement, etc., and it is probable that it is in process of formation, because man, in general, has been writing for a short time as compared with the long time he has used speech, with the result that the centre of spoken language is more organized and fixed than that of written language.

The motor centres of written and spoken language are the seats of a motor function which is more intellectual than that of the centres of the muscles concerned in these particular functions, and must be composed of cerebral units, which mould, by means of innumerable associative paths, various products of near and distant neurones, all contributing to a high function, which, though fundamentally motor, is in reality the most genuine expression of the intellect.

It is quite clear that the areas of which we have been treating must, of necessity, be associative and of the highest value, owing to the numerous relations they have with other parts of the brain, although, by the majority of authorities, they have been comprised in the motor, tactile, or projection zone (from Boyer to Pitres, from Luciani to Flechsig). The relation between myelination, function, and rank would lead to the conclusion that there exists a certain order of functional development which coincides with the development of the myelination of the submantellar white substance. The parallelism, however, does not hold good, but, on the contrary, conflicts with the most assured facts of the physiology of the mantle. Monakow and the consorts Vogt have already observed that it is impossible to formulate any law concerning the progressive steps in myelination, either *per se* or in relation to the development of the functions. Hitzig has adopted the observation of Monakow. It would be quite sufficient to consider the fact that, in the infant, the volitional movements for walking are fulfilled by zone No. 1, which is the first to develop, while the act of walking and even simpler volitional movements are much later in development than the audition of language, which is fulfilled by the areas 7 and 23.

This numerical distribution of areas is not supported by consentient histological observations, nor is it probable, when we consider the proximity of numbers so different; and again, it does not support any of the physiological facts less disputed. The unprejudiced examination of the facts and the very story of the evolution of the cerebral mantle, from the point of view of its function,

leads to the idea that the architectural plan upon which the brain has been developed exhibits a postero-anterior direction. The visual area, from the occipital pole to its extreme anterior boundaries with the somæsthetic zone, increases in functional value from the preponderant sensitiveness to light which is found at the pole to the preponderant perception of objects seen which occurs in the external occipito-parietal region; and, becoming further differentiated and exalted through the most recent and more intense work of modern man, it forms the seat of the visual graphic function at its extreme anterior limit.

In like manner, the motor and somæsthetic zone, extending forwards to the base of the second and third frontal convolution, assumes a functional value very much superior to that of the part of the motor zone concerned in the movements of the muscular regions of the face, tongue, pharynx, larynx, and of the limbs, which are severally brought into play by mastication, deglutition, respiration, shouting, prehension, etc. Precisely the same muscles are called into play in such high motor functions as spoken language, residing in the foot of the third, and writing, in the foot of the second, frontal convolutions, in proximity to the cortical areas of the same muscles. From this it still appears clear that speech is a function of the motor or senso-motor zone (intermediate territories), while in fact this zone is an associative one of very high value, proportionately to the immense number of sensory and motor components which directly take part in the function of that part of the cerebral mantle.

I formulate the hypothesis that, as the anterior part of the visual zone represents a zone of evolution of a much higher degree than the rest of the same zone situated posteriorly, so the pre-Rolandic area, considered as a part of the senso-motor or somæsthetic zone, may be only an evolutive motor zone in the sense that it represents the field of the outward manifestation of the higher and more intellectual motor activities displayed by the most highly developed men.

By writing we call into play the same limbs and the same muscles as in the more elementary and coarser movements occurring in the multiform needs of life. The more elementary movements of the upper limbs are those by which we grasp something which appeals to our bodily needs and satisfies our individual instincts.

The evolved man no longer uses his arm for preservation and defence alone, but for numberless crafts as well, and, above all, to express in writing his own thoughts and emotions in his social relations—that is to say, that the motor zone in inferior beings and also in people of less developed races presides over the movements of self-preservation and self-defence, and that, when through civilization man has attained to that sublimity of thought that exists to-day as compared with past ages, and has acquired a wealth of

language by virtue of which the emotions and individual accomplishments become common property through the medium of graphic symbols, there must be formed in this same motor zone for the upper limbs a special co-ordination for writing. Are such movements for writing formed by momentary associations (according to the doctrine of Dejerine) with those same motor elements in the central part of the first Rolandic convolution, or do they emanate from another specialized anatomical territory? Those who deny the existence of a graphic centre draw their arguments from the fact that we write also with the left hand. If there were a centre for writing, the function could not be displaceable. Writing with the left hand, and in a sort of way also with the feet, permits us to infer with Dejerine that there does not exist a special centre for writing. But I would observe that the formation of single graphic signs, which can be executed with the feet, even although we may not be accustomed to it, is one thing, the automatism with which we usually write with the right hand is quite another, seeing that the automatism presupposes a series of senso-motor images already formed in a given part of the brain, exercised for a long time and in an identical manner.

Such automatism is quite indispensable for *rapidity* and *accuracy* in writing.

It is one thing to write a few bad scrawls, another to fill sheets swiftly and accurately. In other words, just as in the zone which presides over the movements of the upper limb a special centre must be formed to permit the special function in the case of the pianist and the violinist, so specific sensory zones have been developing for language and music. The existence, then, of a centre for writing is more than probable.

I admit, however, that it is possible to have a different topography in individual instances, and that it is possible to have a formation also in the right hemisphere, as in the left-handed and the ambidextrous; but it is advantageous to agree that a new function, as it becomes exercised, requires a distinct anatomical field. If all this be true, we encounter a new difficulty by accepting Flechsig's scheme. The passage from No. 1, which is the common motor zone for the upper limb, to No. 16 on the foot of the second frontal convolution (the presumed centre of writing), while it shows a higher state of evolution of this part with respect to the motor zone situated behind, represents a jump in the process of myelination hard to understand, and it conflicts with the supposition that territory No. 16 may be the centre for writing, as this is much later to develop than spoken language, whose territory is indicated as No. 23.

If we bear in mind what I have already said, that man has been speaking for thousands of years and writing for only a short period, and consider in what enormous proportion literary, scientific, and epistolary productions have increased in the last century relatively

to the same productions of the generality of men in previous centuries, everyone will be convinced that a centre for writing alone can be well developed in but few men, while in the majority of mankind it is only in the course of evolution. It is natural, then, that many lesions of this zone which might have given rise to *agraphia* remain latent because the function is not yet developed like that of spoken language.

The brain is in a state of continual evolution. Therein, if I am not mistaken, we must recognise one of the phenomena of human progress—the substitution, in the course of the perennial evolutionary process, of movements expressed in speech and writing for those coarser and simpler ones with which primitive man reacted in obedience to his emotions and perceptions. The highest mental perfecting consists in condensing in speech all the vast capital of the understanding, reacting on the world not only with individual movements, but also with those which serve to blend the thought and action of the individual with those of the community, of which the highest expression is precisely spoken and written language.

Corresponding to this psychological phenomenon there is formed in front of the motor zone an area with a motor function which is more intellectual, representing a stage of higher evolution and cortical perfecting, given up to the delicate function of expressing the emotions, volitions, and thoughts in spoken and written language. The motor zone of language, however, is included in the zone of senso-motor projection in *Flechsigs*'s original works, among the intermediate regions of the mantle in his later publications; but it yields a product which, by its complexity, can only be the result of associative labour, and from the intellectual point of view such zone is a long way superior to the great posterior associative zone of *Flechsigs*. For that matter, no advantage is derived from the distinction drawn between the zone of projection and the associative zone save the anatomical fact, which can only have a scanty and limited application in psychology as well as in mental pathology.

We pass now to the anterior associative area of *Flechsigs*—the frontal lobe. In many species of animals it is entirely absent; no trace of it is found in the batrachians and the amphibians. In birds we perceive a bare rudiment of it, and thence it proceeds through a constant evolution, becoming differentiated and increasing in volume in the mammals. However, even in the more evolved mammals, as in the dog, it is represented by a very small part of the mantle, almost a rudiment of what is found in the monkey and then in man, in whom it reaches a truly surprising development in comparison with the extent of all the remaining cerebral cortex.

What part does the frontal lobe play in the functional mechanism of the brain? It is not a motor centre: it is not even a centre for sensation; that is now universally recognised,

more so after the experimental demonstration I have given of this fact (Bianchi, 'The Functions of the Frontal Lobe,' *Brain*, 1895). It can be destroyed up to the prefrontal sulcus, as happens in some cases of disease, or as may be experimentally produced in the monkey. In the latter case, after the lapse of a few days, we find neither disturbances of motion nor of sensation. While all the other cortical areas are sensory or senso-motor and correspond directly or indirectly with the special senses or with the various muscular regions, or are the seat of more complex psychic formations of each kind of special sensation, the frontal lobe has functions which have regard to the entirety of the psychic personality. Bilateral destruction of it gives only obvious mental disturbances.

My idea is that the frontal lobe is the organ of the physiological fusion of all the sensory and motor products elaborated in the regions of the cortex, respectively the seats of special sensory and motor functions; it is the organ of the synthesis, present and past, of the two great components of the mind, the somatic-emotive and the intellectual or cognitive.

It is certain that associative connections exist between the various sensory zones, and hence between the products elaborated by the perceptive and senso-motor areas. But the field in which we meet with the greatest disposable number of commemorative images, whose representation in the consciousness is a condition of judgment, is, according to experimental and clinical data, the frontal lobe.

The concrete images are synthetized in man in conceptions or abstractions. The conceptions are nothing else than the product of the synthesis of a number of sensory and motor components and their derivatives, elaborated in the perceptive and the motor areas of the cortex, and moulded into symbolic forms in the zone of language. When, *e.g.*, we say 'religion,' we express a very complex conception, which, in the illiterate, will consist of a few concrete images—a church, some priest, some sacred picture—and a sum of mixed sentiments, with a preponderance of awe and veneration, while in the cultured man it contains in synthesis an infinity of images, notions, and emotions referring to the central conception, like the atoms forming the protagon of the nervous substance. All these numerous series of auditory images (sounds, intonations, and prayers) or of emotions (from the fear of the inferno to the highest and noblest moral sentiments), and all the notions regarding the literature of religions, their origins and transformations—all these components, moulded in the appropriate words, sustained in their turn by an infinity of other simpler components, become synthetized by psychic affinity into one psychic product which we call a conception, and which also becomes expressed in a single word. This process of psychic synthesis, raising the personality and the consciousness above the purely sensory field, is the principal

function of the frontal lobes. The majority of clinical cases, which are daily increasing in number, show very clearly the power of synthesis and cohesion of perceptions that is possessed by the frontal lobes. Persons seriously injured in this region of the brain perceive through the individual senses the impressions of the external world, and react to the individual sensation with comparatively well-adapted movements. They are defective, however, in the power of reawakening and associating the images from whose union result more accurate and complex judgments, and of forming intellectual syntheses of a higher order. I quote an example from the large number of entries in the register of my experiments. To a monkey with brain intact I give a piece of chalk cut like a cube of sugar, of which it is very fond. On seeing it he grasps it, examines it, smells it, handles it all ways, tastes it very cautiously, and finally throws it away. He takes it up again, disappointed in not being able to satisfy his desire to eat it, re-examines it, and rejects it entirely. If afterwards I present him with a piece of real sugar, of the same form and colour, he immediately recognises it, but, recollecting the former piece, which it resembles, first tastes it and then suddenly eats it with great gusto. The refusal of the first piece is the result of a judgment based on the representation of the tactile, visual, muscular, olfactory, and gustatory images of the sugar contrasted with the analogous images of the piece of chalk. Here we perceive a re-evocative and associative power through the recognition of the objects present. If the frontal lobes of such a monkey be removed and the experiment then repeated, it will be seen that all the monkey has lost is the power of re-evoking analogous images in order to synthesize them into the concrete image of the objects producing the actual sensation. This is deduced from the observation that the monkey quickly puts out his hands to obtain the piece of chalk, but does not examine it nor judge it as he did previous to the operation; instead, he puts it into his mouth, masticates it, grinds it, remains for a time uncertain whether or not to swallow it, and then most frequently ends by doing so. There are thus preserved sight, taste, and touch, which give the immediate perception, and result in movements adapted exactly as before for prehension; but there is defective judgment, which can only be got by contrasting the images previously registered with the actual perceptions, or at most such contrast is so very incomplete as not to furnish the data for an accurate differential judgment. It is not improbable that the act of recognition causing the now half-witted monkey to seize the piece of chalk and greedily carry it to his mouth is the outcome of the strongest sensation, which is the visual one, of the colour and form of the object. The appearances are quite similar to those of the piece of sugar; but there is wanting the sum of all the other sensory attributes necessary for the differentiation of the images by contrast.

According to this experiment the frontal lobe should be considered the meeting-ground of the sensory images for discrimination between analogous, similar, and dissimilar objects, so that, if this function is in abeyance, the individual and strongest images remain, and determine adapted movements, while the judgment is almost always erroneous—the more so the more complex the perception involved.

In several cases which have come under my observation of individuals who had suffered a severe injury to the frontal lobes (among others that of a young man in whom a bullet from a revolver had traversed the frontal lobes obliquely from the pretemporal region on the right side to the frontal on the left), the true, outstanding phenomenon was amnesia with incapacity to form judgments requiring the presence of many sensory components. The patient was certainly capable of perceiving and recognising objects, and also of recollecting their names, but he was unable voluntarily to direct his thought and to re-evoke the images wherewith to sustain it for discriminations of the greatest complexity and the process of coming to a conclusion. In this he succeeded only for brief moments and in simple things and positions, in which also he frequently wandered, observing as though his proper physical identity were lost in the intellectual vacuity. What fails in such cases is the keyboard, the keys of which, when touched, provoke the respective sounds from the strings allocated to them. The mechanism is so reduced, however, that the strings touched from without give sounds and notes complex to a degree corresponding to the rapidity of execution; but without the keyboard there is no longer possible that rapid and co-ordinated reproduction of tones fused in the sweetest harmony of a score.

No one can affirm that such a fusion of concrete images—or if not fusion, at least their rapid succession and correlation by psychic affinity—happens in any other part of the brain by means of that intricate reticulum formed by protoplasmic and axis-cylinder prolongations given off in all directions from the cells of the cortex. It is a certainty, however, that extirpation of the frontal lobes, without removing any of the sensory and motor dominions of the personality, renders it incapable of utilizing its own accumulated capital, deposited in the great sensory and senso-motor treasuries of the cerebral mantle.

The frontal lobes are not only the organs for the physiological fusion of the perceptions leading to the formation of conceptions, and the field of recall and summing together of the concrete images employed in the process of reaching conclusion in the judgments which the *ego* is called on to form in the various positions wherein one finds one's self, in the ever-changing relations to the external world, but also the organs for physiological fusion of the

elementary sentiments of each individual, from which arise the highest human sentiments characterizing modern civilized man. After mutilation of the frontal lobes in monkeys we find weakened, almost to the point of disappearance, the sentiment of maternity, the affection for and responsiveness to the persons tending them, to whom they were wont to show strong attachment in all sorts of ways.

The same family sentiment, which also possesses its evolutionary history, shows itself more unstable and liable to decay in individuals who have a weak development of the frontal lobes. They are always very egoistic and incapable, regarded with relation to the social functions. The altruistic sentiment, which passes the limits of the family and of the country, and tends towards humanitarianism without regard to nationality or race, and is always in course of evolution, as well as the social tendencies of our times, which are the highest expression of sentimentality, are only the products of physiological fusion of the individual emotions in a universal sentiment which judges all at the same value, and determines all to actions tempered and directed for the common good. All this disappears on destruction of the frontal lobes.

Love (which I have found reduced to rudimentary and brutal expressions in monkeys with mutilated frontal lobes), in its highest and most spiritual manifestations, is likewise a very complex product, the various factors of which are united by an intimate affinity the result being a product of an extremely high psychic value. There is not enough space to record such factors as Ribot, Mantegazza, and others have brought to light. It is certain, however, that with mutilation of the frontal lobes love, in the monkey, is reduced to the most brutal, brazen-faced, and often ineffective expression.

The same might be repeated of the moral sentiment, which is evolved from the egoistic sentiment, and is continually realizing its fulness in social life. The moral sentiment consists essentially in this, that the individual who, in the struggle for existence, originally used primitive arms of offence and defence against others who were contending with him for the means of subsistence, and competing with him for the satisfaction of their personal instincts, now achieves the same end by incorporating his egoistic sentiments with the emotions of his fellow-beings—which is nothing else than physiological fusion of the sentiments of the social units. In this manner he displays his activity in a form of labour which, while proving useful to himself, is helpful to others. Thus the labour of the truly evolved man resolves itself into individual and social well-being. Now, such logical fusion of the personal emotions with those of other individuals of society (seeing that the modern man cannot be considered as an isolated unit, but as forming part of the social organism) is a function of the frontal lobes. The

clinique, as also experimentation, furnishes us with many facts in proof of this statement, because in the majority of individuals who have suffered an injury to, or a serious affection of, the frontal lobes, the most frequent phenomenon is profound change in the moral character of the individual, who becomes egoistic, irascible, solitary, impulsive, and unsociable. The monkey deprived of its frontal lobes becomes less tractable, as well as impulsive, unaffectionate, and indifferent to the person or the animals of whom formerly it was very fond.

The majority of born delinquents have a defective development of the frontal lobes, as one can often infer from an external examination. They have a forehead low set, narrow, and receding ; on the other hand, they show strong development of the jawbones, the frontal sinuses, and the supra-orbital crests. If among them there be one who presents a large forehead it usually is identified with an individual who has suffered from hydrocephalus in infancy, delay in ossification of the sutures, etc.

The consciousness likewise has its anatomical substratum in the frontal lobes. What we call the *ego*, which is cognisant of time and space, is not an invariable unit, but is even very changeable in the course of time—*i.e.*, in the history of the individual. It is only in part the synthetic representation of self, because it partly reflects also its environment. Here we always find the same law of evolution ; the consciousness of cephalopods is one form of consciousness, that of reptiles another, that of the dog a third, and so forth. In proportion as the anatomical elements of the cerebral mantle increase in number they contribute towards the formation of the consciousness, which we can recognise in its various stages of evolution. With the histological elements the notions of the external world are also virtually increased in number, and the differentiation of the *ego* proceeds in proportion to the number of notions, emotions, and reactions.

The constant law is that the consciousness perfects itself in proportion as new and more numerous nervous elements are called to take part in the work of the cerebral mantle. Now, it is natural that the somatic consciousness, in so far as we feel we are living, and experience by turns now the hurried pulsing of pleasures, now the raging violence of organic pains, real or imaginary, is only a partial consciousness, until there is added to it the consciousness of all the individual perceptions and all the psychic compounds resulting from the infinite combinations of perceptions. On the other hand, consciousness, considered as the central point of recognition of perceptions, emotions, and reactions, changes every moment under the influence of the external stimuli, which act on our senses in extraordinary number, and furnish new material for the perceptive laboratories and for that of the consciousness, where the

old components meet with those fresh ones coming every moment from without.

Such consciousness is only a synthesis on the basis of a memory which sums up the history of the individual throughout each unit of time, and is referable to a given quality of stimulus. On the other hand, the consciousness should be considered as divisible into internal and external—the *me* and *mine*; the knowledge we have of ourselves embraces not merely what we are as a complex of notions, sentiments, and actions, which have become integral parts of ourselves, but likewise everything that appertains to us: there is an exterior zone, so to speak, of the consciousness, but one which completes it. The family members, those with whom we associate, the objects which belong to us, our possessions, the duties to which we apply ourselves, the world wherein we live, and from which so many sighs reach us, reawakening emotions always alternating, all form a part of our consciousness. The second part of the consciousness becomes synthetized with the first, but is itself more and more subject to increase through culture and social and cosmic relations.

Let us picture to ourselves the solitary man. He has certainly a consciousness—somewhat limited withal—of himself, his actions, his affairs, and the surroundings in which he lives. He is very different, however, from him who lives in the social atmosphere, and who feels a flow of energy coming to him from his surroundings, and a reflux from himself to the outer world. The latter is no longer a free unit in space; he is a point of afflux and reflux in the great social and cosmic organism.

As in the case of intelligence, so also in that of consciousness, being the point of synthesis of all the components of the personality and its relations with the outer world, all the cortical zones contribute their quota to it. I am unable to accept the opinion of Flechsig, who holds the tactile sphere to be the central organ of our intellectual existence. The tactile sphere furnishes at most the organic and emotive components of the consciousness, in the same way that the sensory sphere furnishes the intellectual and organic (organic because the perceptions contain senso-motor components); but the frontal lobes represent the field of meeting and synthesis in both cases. In fact, those individuals who happen to have defective development of the frontal lobes, or have suffered a serious lesion thereof, show a notable dispersion and reduction of the *ego*. In the same way, monkeys deprived of their frontal lobes certainly show the possession of a somæsthetic consciousness, but this is no longer so accurate as that resulting from the fusion of the organic consciousness with the components referable to the environment. All the psychic components of kinship, love, friendship, gratitude, and sociability disappear, so that the animals lead solitary and indifferent lives.

It is said by some authorities that the frontal lobes might constitute the organ of attention. The question is one concerned with the activity of the mind, of the physiology of which much has been said and written. The act of attention, whereby in a given unit of time we select from the most various external stimuli that which is agreeable, upon which we concentrate our faculty of observation, and which we perceive better than others, is a process undergoing many modifications in different individuals, and in the same individual at different times, through external and internal circumstances and through pathological conditions. Mental maladies, or the majority of them, present a rich collection of qualitative and quantitative alterations of the attention up to complete abolition. Attention is only a reflex phenomenon of the *ego* in response to the stimulus acting on our senses, or the recent or former image of it, or the more complex psychic products of which one or more images are the strongest components (direct or derived attention). I must not dwell here upon the physiology of attention, but to say that the frontal lobes are the centres of attention is to limit or restrict the function of the frontal lobes to a single phenomenon, to one component only of the complicated mechanism of its activity; for it is evident that voluntary attention is only realized through the mnemonic reawakening of perceptions similar, analogous, dissimilar, contrasting, and their direct or derived compounds, etc.—that is to say, through the synthesis of the perceptions and their derivatives, direct and indirect. If such synthesis be not realizable, a true process of attention does not appear possible.

In fact, those individuals whose frontal lobes are undeveloped never present much power of attention; on the contrary, their psychic life resolves itself into senso-motor reflexes, or they give clear evidence of that state of which James says in happy phrase, ‘The foreground of consciousness is filled, if by anything, by a sort of solemn sense of surrender to the empty passing of time.’ By extirpating the frontal lobes we can suppress volitional attention in those animals which in the zoological scale present a more notable development of this faculty—*e.g.*, dogs and monkeys. Thus, also, persons who have suffered an injury to this region of the brain show a feeble power of attention, do not pause to reflect on anything, in some cases are bewildered, in others impulsive or restless, distracted and inconsequent in their reasoning. It becomes impossible for them to maintain, connected and flowing through the field of consciousness, a great number of psychic components.

Attention, considered as a reflex, is not an exclusive function of the frontal lobes, but a phenomenon emanating from the activity of all the sensory zones of the cortex; volitional attention, however, is intimately connected with the function of the intellectual and sentimental syntheses, which induce strong states of conscious-

ness, and it therefore appears weakened, both in man and animals, by the mutilation above referred to.

It is also held that the frontal lobes may be the organ of inhibition. It is well to be agreed on the definition of inhibition, because it will be impossible to understand anything of it unless by admitting a dynamism whose field of action may vary in the different provinces of the central nervous system. We put aside both the physical theory of interference (Cyon and Lauder Brunton) and the chemical theory of assimilation as applied to the phenomena of inhibition. The simplest fact is the inhibitory influence which the brain exercises on the spinal cord. When an animal is deprived of its brain (it may be a frog or even a mammal, for it is seen that even mammals of the higher orders can stand extirpation of the whole cerebral mantle—Goltz—and survive the operation), and is then excited, the spinal reflexes are found to be exaggerated, and the reaction to the stimulus occurs in a shorter time than in the normal condition (Schiff, Oddi, Landois, Fano, Libertini). When, on the other hand, the cerebral mantle is acting, the reaction time is longer and the extent of the movement is less. This fact of the diminution of the time and augmentation of the reflex, consequent upon the abolition of the function of a more evolved central organ, is an expression of the inhibitory influence which one nerve centre exercises upon another. It seems to me almost impossible to consider the inhibitory power as a specific function which may be exercised by certain particular organs upon certain others. Such a conception is bound to disappear from the physiology of the nerve centres. I go upon the principle, founded on observation of facts, that every nerve organ, particularly of the cerebral mantle, can in its turn be a centre of inhibition and an inhibited organ at different times and under varying circumstances.

The experience of everyone at all times will competently support this theory. If one of the perceptive centres is hyperfunctioning under the influence of adequate stimuli, it becomes, by the very fact of the increase in activity, a centre of inhibition of the others with which it may be in anatomical relation. The sight of a picture which takes us by surprise, of a scene which pleases us, or the reading of a page which interests us, puts in hyperfunctional tension one or more cerebral provinces—let us suppose the visual zone and the frontal lobes. If during the work of the visual region a slight noise such as would have been remarked in a state of repose is made, under these circumstances it passes unnoticed, or, even if noticed, does not become a perception. The auditory centre in such a case is inhibited by the hyperfunctioning visual centre, and it is then unable to transform into perceptions the acoustic waves which arrive there, or to transmit the products of its function to other provinces for further psychic combination. If, however, the

auditory stimulus is very intense, it determines a hyperfunctional state in the organ of hearing, and then, under the altered condition, the noise is rendered perceptible ; but at the same time in which this happens the auditory centre exercises an inhibition upon the visual centre. The perceptive intensity of the latter zone diminishes (inhibition), and the frontal zone becomes more active in another direction and establishes closer relations with the auditory region, whereas before it was more engaged with the hyperfunctioning visual zone. From these two cases we see the variable orientation of the frontal function, which may superexcite one region of the cerebral mantle—when more direct and numerous functional relations are established between the frontal zone and this region—and lower the intensity of another with which it comes into a less close relation for the time being. We deduce from this that the frontal lobe exercises an exciting action upon the perceptive zones with which it has functional relations.

If, while walking, one is overwhelmed by a thought which involves great mental activity, unconsciously the pace is slackened ; this is an inhibition of walking. If, on the contrary, one is bent on arriving somewhere, and the object of the walk is vividly represented, the pace will be rapid and brisk in proportion : nothing else crossing the threshold of consciousness, be it external or internal, will exercise a power of arrest on the walking unless it be substituted for the object of the walk. Then only has an extraneous thought the power of slowing the pace, and even the consciousness of the object of the walk may in given cases succeed in slowing or arresting thought.

A similar action of arrest of the higher functions by the lower is very weak, and we cannot estimate it except in morbid states. The more demonstrable fact is that the higher function may exercise a directive and inhibitory influence on the lower. If the higher value is to be placed upon the frontal lobes of organizing and synthesizing the intellectual and emotional products of the work of all the other parts of the cerebral cortex, they must be retained as the inhibitory organ *par excellence* of the other parts of the same brain with which it has direct and indirect functional relations. Much of the nervous dynamism is explained by the numerous interlockings occurring in such a complex mechanism as that of the frontal lobes, compared with the other cerebral provinces, on which, however, under the influence of external or internal stimuli, it exercises a stimulating effect. The nervous activity is the same all over. There is not a separate apparatus for inhibition (on which Munk, Duval, Luchsinger, and Haidenhain are agreed), and we cannot, like Oddi, restrict the phenomenon of inhibition within the common doctrine of the cerebral localizations. To say that the frontal lobes are set apart for inhibition is to substitute a corollary for the whole chain of reasoning.

In concluding this first part of the work, one can symbolize the cerebral mantle as a state with a representative system—a parliament and government. The mantellar parliament would be constituted by the perceptive zones, each of which furnishes to the central government the product of its own labour, accomplished with material prepared by the force of Nature from the primary receptive and ganglionic neurones throughout the course of successive years. The central government would be represented by the frontal lobes, which, utilizing the products elaborated by all the members of parliament, direct in their turn the legislative work to the advantage of the people, who in the nervous system are represented by all those millions of neurones, scattered or grouped together in the sensory periphery of the body, in the ganglia, in the spinal medulla, in the posterior, mid, and intermediate brain, their products being transmitted to the perceptive centres, which merely transform them and transmit them in their turn to the government, whose synthetic, directive, and regulative influence displays itself in the adaptation of the individual to the new conditions of existence, and in the extension of the individual and social environment.

The primary neurones labour without the consciousness, and have no direct representation in the conscious field of the personality; but their work is as necessary as that of the neurones of higher grade, because they incessantly furnish material for the increase of the intelligence and personal consciousness, and are thus their substratum.

In the same way that obscure workers among the common people add their quota to the life and prosperity of the state, just as those who, with their efficacious and co-ordinated action, direct the energies and opinions and determine the efficiency of the parliament and government, so the lowest neurones prepare the materials that have to serve for the formation of the concrete images in the perceptive zones which represent the infinite aspects of Nature. They become synthetized in the individual and in the collective consciousness, just as the representative government synthetizes the notions, the desires, and the tendencies of the representatives of the people, and in its turn exercises the supreme directive influence over the individual reactions upon the world.

Fortunate is that state whose representatives are the expression of the intelligence, emotions, requirements, tendencies, and aspirations of the people, and whose government utilizes, in its policies and decisions, the products elaborated by the members of parliament; and fortunate is that people whose government, appreciating its character and interpreting its needs, knows how, with a happy synthesis, to utilize the labour of all the active social units in order to bestow upon all its beneficent work. The work of the frontal lobes, which resemble the government in synthetizing the products

elaborated by the perceptive centres and the emotions of the individual and of the community, in the same fashion that the sensory and perceptive areas synthesize the labour of the inferior neurones, supplies the secret of the fortunes of the individual in his environment, or of a race in its international relations.

The motor zone converts the emotional and ideative impulses into acts, which are determined either by the demands of single representatives of the people and of parliamentary groups, or by the deliberations of the government, resulting from the conscious synthesis of the work and requirements of all—that is to say, putting aside the metaphor, by either the sensory perceptive zones or the frontal lobes. The former exert their influence on the motor centres either by the actual perceptions or the commemorative images with their derivatives and compounds, or by the products of hallucination. The frontal lobes, on the other hand, put to account, in the process of deliberation and the resultant impulse, all the requisitions and products of the other perceptive zones, and by contrasting them in the history of the consciousness with similar and analogous requisitions, impede the movement or impress on it that direction which is best calculated to facilitate the aim in life of the individual, considered as a social unit. Such deliberative and directive power over the conduct is accordingly defective or wanting in monkeys after mutilation of the frontal lobes, as also in those persons who show defective development thereof, or have suffered from somewhat extensive and bilateral lesions in that region.

The parallel is of little account, though to some this may seem a paradox; but there is much value in the final conclusion, in which all can agree—viz., that the frontal lobes are, in their ultimate analysis, the organs for the direction of the individual in the social and cosmic environment. In the complex psychic activities of the brain, the frontal lobes, by utilizing the product of labour of all the sensory and motor spheres, fulfil functions that are eminently social.

I regard the following scheme, according to which each sensory area on the external face of the hemisphere is represented in its extent and its functional gradations, as being more in harmony with the best-established facts, experimental and clinical. The terminal embryological territories of Flechsig are only evolutionary zones, and each of these belongs to the perceptive field of the respective special sense.

The evolution is functional more than anatomical, because it still remains to be demonstrated that the myelination of the fibres may show differences in time, extent, and order in the brain of a savage as compared with that of a first-class man in civilized Europe. The problem assumes another aspect when one considers that in a relatively brief time the uncultured individual can greatly augment the sum of his knowledge and extend immensely the action of his

intellect by virtue of an anatomical substratum pre-existent, though not yet in use.

In my opinion we are warranted in admitting, on the basis of clinical and experimental observations, only one area that is not really in direct connection with either the organs of sense or those of motion, and that is the frontal lobe. The scheme shows, also, that there are small areas of the cortical field which physiology has not yet taken up; the most important of these is the inferior temporo-occipital region.

We should mention still further what relation the cerebellum

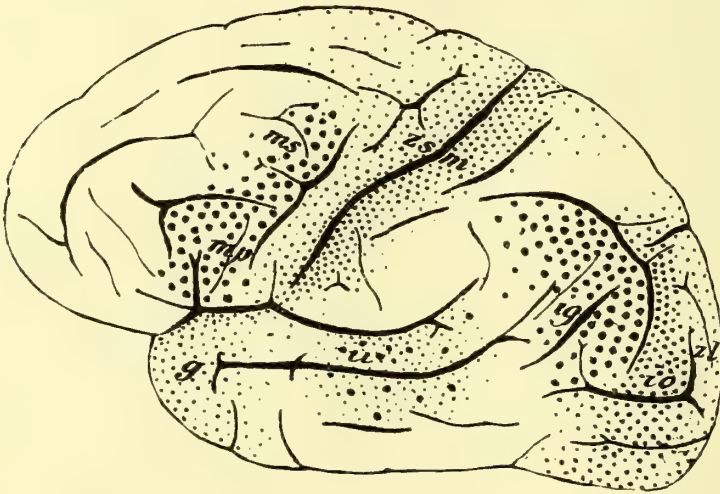


FIG. 54.—SCHEME OF THE PSYCHO-PHYSIOLOGICAL TOPOGRAPHY OF THE EXTERNAL ASPECT OF THE CEREBRAL MANTLE. THE POSTERIOR DOTTED AREA—OCCIPITO-PARIETAL—IS ALL CONCERNED IN THE VISUAL FUNCTION.

zl, Zone for the luminous images; io, zone for the images of the objects; ig, zone for the graphic images (the extent of each is approximately indicated by the size of the dots); u, area for hearing (the large dots represent the auditory images of words, which do not possess a special area); g, zone for the gustatory images; zsm, sensomotor zone or tactile zone (according to some) with the two evolutive areas; mp, motor zone for articulate speech; ms, motor zone for writing. The entire surface situated in front of these is the area for the physiological fusion of the psycho-sensory products elaborated by all the other areas.

has with the psychic functions, but the observations are yet too scant to admit of any hypothesis whatever. No one should fail to record observations of mental weakness of all those in whom there is demonstrated, at the necropsy, the existence of profound and extensive lesions or defective development of the cerebellum. In such cases, however, there have been found, or it has even been possible to assume *a priori*, such lesions of the cerebral hemispheres as would render it arbitrary to assign to the cerebellar lesion the mental decay, or, better, the weak or feeble attempt at mentalization.

Nevertheless, there comes to be accepted and accredited in the

mind of one who reads all the observations, or who has occasion to follow the progress of such affections, the supposition that the cerebellum is not outside the sphere of the intellectual functions, to which it appears it may lend vigour and power of resistance. In a weighty anatomico-physiological synthesis upon the neuraxis, Professor Antonelli (*Il Nervasse nel suo insieme*, 1899) inclines to admit, not without good reason, that the cerebellum may be the larger centre of the reflexes. Considering the reflex in its widest sense, one can subscribe to the hypothesis of the distinguished professor. But the cerebellum seems to be likewise an accumulator which is constantly discharging itself through the numerous afferent paths, and reinforcing the energy of the cerebral mantle. The future alone will reveal the part which the cerebellum plays in the work of the cerebral mantle. A book like this permits of only a brief allusion to the great problem.

PART II

CHAPTER I

PHYSIO-PATHOLOGY OF PERCEPTION

VARIOUS authorities have compared mental with somatic life, and have sought to establish parallels in the development, function, and governing laws of each. Although this plan has not met with universal approval, it cannot be denied that it has a good foundation of truth, and it appeals very strongly to medical men, who are in the best position to utilize the rich patrimony of biology, and to make such a method productive of good results. Mind, considered in its entirety, is, after all, only the other aspect of life ; it is constituted like an organism that has its evolutionary story, and it is governed in its manifestations by fundamental laws common to life in general. Among these there is substantial and constant that of taking from the external world, of assimilating the energies of Nature, and transforming them into psychic force. The body receives and transforms matter, the mind receives and transforms all the cosmic energies of which it is the synthetic equivalent. As life may commence from plastiduli (Haeckel, Maggi, Erlsberg), or from gemmules (Haacke), or from physiological molecules (Spencer), one can agree in any case with the supposition already advanced by many (*vide* Part I., Introduction), that the mind may commence in these same primitive elements, and that, solely by a series of transformations and accumulations, it then manifests itself more clearly in the unicellular organisms (the amœbæ and the monadæ), and still more so in those organisms in which the first nervous structures become apparent through successive differentiation of the primitive morphological elements.

As it is without the scope of a treatise such as this to take up the story of the development of the nervous system or that of the mind, and much less that of comparative psychology, we may limit ourselves here to the statement that the phenomenon of reception consists in nothing else than *the action of the cosmic energies on the organism, and in that of the organism modified upon the cosmic energies*. In beings with an evolved nervous system this function is assumed by the nervous tissue.

This action, however, is very soon accompanied by the notice of it by the organism itself, which, then, is orientated on the one hand towards the agents operating upon it, and on the other to the historical formation of the issue of the action in question, which, again, generates consciousness. The point where consciousness begins is the starting-point of the sensations, which, by a process of evolution that may be followed philogenetically and ontogenetically, give rise to the perceptions and the sentiments—that is to say, to successive notions and to successive modifications of the *ego*, which are the two fundamental factors in psychic life and in all the vast and complicated mechanism of the mind.

Hence, according to some, sensation, taken in a very general sense, would consist in the modification induced in the nerve elements by external agents, even though the latter should not be noticed. To prevent confusion, however, and to avoid all possible controversies and doctrines that are too aprioristic, and surpass the limits which I have imposed on myself in this work, and all that has been mentioned in the first part of this volume with regard to phototropic and heliotropic phenomena, we may, without any risk, set out from a clearer point by defining sensation as *the notice of the modification induced by external agents* (stimulus).

This definition is true if we regard sensation from a general point of view in the zoological scale, or if we look at certain stages of the mental development of man or the higher animals, seeing that the simple fact of noticing is almost inadmissible in the developed man. In him the usual sensory process is complicated and perfected by the formation of concomitant states, by means of which he is enabled to recognise the agent and to refer the point where the stimulus has acted to the periphery of the body, or to space, at various distances and in diverse spacial relations with the external world. It is otherwise, however, in the case of the first sensations of the newly-born infant, while it has not yet developed the sense, much less the notions, of space, and sums up everything in the elementary retinal and cutaneous sensations which it experiences and with which is confused its nascent *ego*; so also in all those beings with a nervous system in process of evolution, but still very simple and scattered, in which case we can admit only simple sensations, with likewise simple reflex manifestations, representing the sole cycle of their psychic life.

Sensation must not be confused with perception. It merely furnishes one component of perception, while perception furnishes all the fundamental components from the sum of which arises the notion of the agent and its precise distinction from the *ego*. We might, like James, suppose the distinction that we would in this manner draw between sensation and perception to be suppressed, all the more that in the adult and evolved man it is almost impossible to conceive of a simple sensation such as we suppose to

occur in star-fishes and molluscs, or even in newly-born mammals, and we might limit ourselves to the very concise statement that sensation is more simple than perception. To me, however, it seems more opportune, if we confine ourselves to the human being beyond the stage of infancy, to speak of grades of perception, and to restrict the conception of sensation to that process in which *the noticing of the modified ego is given solely by the external component of perception*. If we remove the cerebral cortex from a dog (Goltz), or the hemispheres from a pigeon (Flourent, Lussana, Schiff, and many others), the animal still has visual sensations, yet does not perceive; it does not show that it recognises objects, and it is no longer able to estimate distances. This shows that even the subcortical cerebral organs receive and transform the waves transmitted from the receptive organs located at the periphery of the body in immediate relation with the energies of the external world. Nevertheless, though this process of reception and transmission to a central organ constitutes the fundamental fact of sensation—that is to say, the noticing of something that has acted on or in the body—it is only one of the factors of perception. To arrive at perception we must have the concurrence of two other factors: the motor component which is associated and fused with the sensory component, and the recognition of the sensory component, which consists in the association of the present sensory wave with past sensory residua, similar or analogous in character.

These two components, both of them internal, are absolutely necessary for the formation of the perceptions—that is to say, for perception—and demand a higher development of the nervous system, either in the form of associated ganglionic masses, as in insects, or the more conspicuous form of the cerebral mantle, which is superimposed on the old exclusive organs of sensation that we find in the invertebrates.

The conception developed in the first part of this work regarding the importance of the motor element in the formation of the images—a conception I have held since 1882—finds abundant proof in the result of recent experimental researches. Bourdon has demonstrated that monocular perception of unknown objects is derived especially from the movements of the head, associated with the retinal displacements that result from the monocular parallax. If the head is in a state of immobility the perception is somewhat rudimentary and incomplete, and even this is due in part to sensations of convergence associated with the changes of accommodation and the retinal displacements caused by the movements of the eyes.

This is demonstrated also by the behaviour of infants with congenital cataract. Two such cases have been reported by Vurpas and Eggli (*Année psych.*, 1895), who have noted that sight at first gives no aid in the judgment of distance or direction, or in the form, extent, and curvature of objects.

Seyfert arrives at the same conclusion by quite another method. He affirms that the principal factor permitting the exact perception of simple forms is not at all the retinal image, but the muscular sensation of the eyes. As the result of these researches and the analogous ones of Bourdon, Münsterberg, and others, it is beyond dispute that perception is not a simple factor, but results from sensory and motor components, present and past, in more or less extensive association. Accordingly, the scheme I have put forward, and which is reproduced below, is quite justifiable. The other internal factor to which I alluded a little ago is the recognition, which

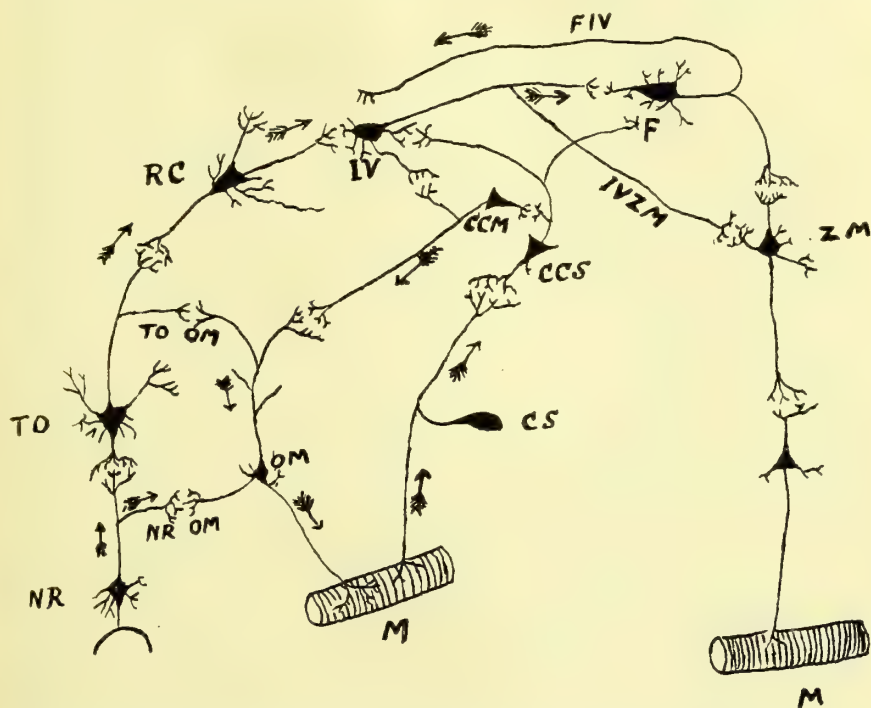


FIG. 55.—SCHEME INDICATING THE COURSE OF THE SENSORY WAVES FOR THE FORMATION OF THE CONCRETE VISUAL IMAGES, THE HIGHER MENTAL PRODUCTS, AND THE REFLEXES OF THE VARIOUS GRADES (*vide*. p. 106 *et seq.*).

consists in the awakening of a state of consciousness analogous to one set up on some former occasion under the action of an identical or similar stimulus. This fact, which, at bottom, consists in the physiological fusion of identical, similar, or analogous perceptions, at different times and under different circumstances, impresses the character of progressiveness on this modality of the psychic process.

Progressiveness of the perceptive process is met with as a fundamental law, constant throughout both the philogenetic and the ontogenetic story of perception. This furnishes combinations that are more complicated the richer the patrimony (consisting of combinable components) of the psychic personality. In my opinion

we cannot accept the hypothesis of Allin, who holds that perception consists in the reception and registration of the features of the present fact, without intervention of the mental content of previous formation, as a result of good observation. On the contrary, there seems greater probability in the opposite doctrine upheld by Bain, Wundt, Herbart, Mill, Hofding, James, and others, that the perceptive process refers partly to the present fact and partly to the recognition of a large or small number of features (images) which, through former acquisition, have become a utilizable capital of the personality, which every day grows richer in new perceptions, that are continually entering into new and complex combinations with the waves penetrating from without and stimulating the perceptive process.

The image that the infant forms of an orange before smell and taste are developed is much simpler than occurs later on, when it is able to distinguish the smell and the taste of the orange, these giving rise to new olfactory and gustatory components, which enter into combination with the visual and tactile components in order to furnish a more complex psychic product. Still later it learns the word corresponding to the object, then the graphic symbol of the word, and these are so many other successive components, which, along with the former, enter into a combination whose increasing complexity symbolizes the progressiveness of the perceptive process.

On the other hand, we cannot agree with those who profess exclusively the doctrine of recognition in which they sum up perception. Such a doctrine excludes the conception of progress, which finds its only natural explanation in the perception of differences—that is to say, in the capacity to gather new features and new relations in the external world, as well as to furnish new and useful combinations with the perceptions and the secondary products of these that have accumulated in the mind. The first locomotive whose shrill whistling and laborious puffing were heard in the valleys of the Sannio, I remember as a youth, was judged by the astonished people to be the work of the devil. In that case the new visual and auditory features of the train became combined with the psychic content of the mind of the people of those times, a people who attributed every new and surprising affair to supernatural forces.

The law of progressiveness in the reception and combination of the ever-increasing acquisitions solves also the question of the difference between perception and apperception.

Here we experience again the difficulty we found in defining the difference between sensation and perception. It is even more difficult, however, to distinguish between perception and apperception. In fact, while in the story of the development of the mind we meet with a moment in which sensation,—taking for example the visual sensation in molluscs, worms, mammals, and infants,—consists in a simple noticing of light until several days after birth,

there being no trace of perception of the luminous objects, but merely evidence of luminous sensation—which is a very different thing—in vain do we seek for an analogous line of separation, somewhat artificial though it be, between perception and apperception. The latter consists in perception courted by a much larger number of associated relations, which again presupposes the conservation of previous psychic formations, with which the new percept enters into combination, giving rise to more complex judgments and a more perfect notion of things in the external world and their relations with it. Apperception is a more acute perception, rendered possible by a more concentrated attention, and promising results of much greater advantage for the evolution of the mind (*vide* the following chapter on attention). It is, accordingly, the highest expression of the perceptive progressiveness.

This law of progressiveness has also been demonstrated experimentally by Luckey, who, examining children with the view of determining the evolution of the visual field for colours, and hence the retinal sensibility, found that, if we consider the retinal sensibility for colours in the adult equal to 100, it is about 59 in a boy of thirteen years, and about 37 in one of seven years. It is probable that the retinal sensibility for colours may increase gradually with exercise in each individual, and especially in a particular class of workers. In fact, according to the researches of Kirschmann, Fick, Hess, and especially of Luckey, the retinal surface is not equally sensible to colours; the central regions perceive colours better than the peripheral. Certain it is that, while historically, as appears from the researches into the ancient lays of the Veda and Zend-Avesta, we have no proof that all the colours of the spectrum were then known, but only some of them—those with longer vibrations (red, orange, etc.)—the number of the nuances and the distinction of the colours of the spectrum is at the present day extraordinarily increased. Külpe and A. König have determined the number of the nuances to be from 150 to 164, and the number of the distinctions from 660 to 696. On the other hand, it is well known that the manufactures of Gobelins of Paris include 18,000 nuances, and the Italian mosaics still more.

One of the conditions of perception is that the stimulus reach a degree of intensity sufficient to enable it to overcome all the resistance it meets in its course, and to cross the threshold of consciousness. There is an infinity of weak stimuli that we fail to notice, and yet we must admit that they operate on the peripheral nervous extremities of the senses. If, while we are listening to a uniformly sonorous body, someone remove it to a distance until we no longer hear any sound, no matter how attentive we are, and we then apply a multiplicator to the ear, we again hear the noise or the sound that had disappeared. At a certain distance on a railway that runs straight for several kilometres we no longer

notice the lights of a receding train, and first of all the white light disappears, and then the red becomes gradually less distinct, till it entirely fades from view. If, now, we apply a binocle to the eyes the lights again come into view. This shows that the luminous waves arrive at the retina, but the nerve-waves into which they become transformed are not of sufficient intensity to overcome the resistance of the optic paths and to reach the sensory zone of the cortex.

The importance of the intensity of the stimulus is demonstrated by quite a number of experimental facts. As Bourdon has remarked, the distinctness of the visual perception of form is in strict relation with the visual acuteness, and this in its turn is closely allied with the intensity of the illumination.

The absolute intensity of the luminous point not only has a notable influence on the perceptibility of objects, but, as results from the experiments of Ashley, increased intensity of the light gives the illusion that the object is at hand, while, on the contrary, diminished intensity of the light gives the illusion that the object is at a distance. The intensity is of even greater value when concerned in the discrimination between two sensations.

If the distinctness of the spectrum become gradually diminished, we arrive finally at a point where we no longer discern the colours, but see only a bright field (experiments of Kries and Hillebrand). The purely quantitative anomalies of perception may all be corrected by augmenting the intensity of the stimulus, and this independently of the *co-efficient of imaginative variation* introduced by Faucault ('*Mesures de la clert  de quelques repr sentations sensorielles*,' *Revue philosophique*, 1896), and given by the tendency to aggrandise (positive co-efficient) or to diminish (negative co-efficient).

It is, however, a matter of common observation that when the intensity exceeds a determined degree, variable between certain limits, the perception loses in precision. Everyone knows that a loud noise gives less precision as regards its intrinsic character, its direction, and distance, than one of less intensity; a painful stimulus appears to occupy a much larger cutaneous surface than a tactile stimulus of the same extent; a highly luminous body certainly dazzles, but it is not perceived in its particulars (circles of diffusion in the retina and the cortical zone).

Again, the duration of the time of successive perceptions exerts a strong influence upon the perceptive process. When two stimuli operate contemporaneously, or succeed one another very rapidly, the perception of one or of both is imperfect. A kind of interference occurs in the latter case and a selection in the former.

This fact, which everyone can prove from his own experience, has been confirmed experimentally by the researches of Robinson. The converse of this same law explains the great tactile and acoustic acuity of the blind. The celebrated pianist Tabbozzi, educated at

Naples in the blind institute directed by Martuscelli, possesses a marvellous perceptive fineness—tactile, muscular, and acoustic—through which he perceives with his finger-tips and with surpassing rapidity, the musical notes of the scores; he has formed a clear notion of the streets traversed by him in Paris, London, Milan, and Palermo, whither he went to give concerts, and he also knows the topographic disposition of the furniture in any drawing-room where he has once been received: his tactile and muscular as well as his acoustic memories permit him, when new pieces are executed by others, to repeat the notes on the piano, and to rise in a short time to a perfection of execution met with only in the great masters and pianists.

This law, however, has not a few exceptions. In some cases, under the influence of a new stimulus, the perceptive power for a given sensation is increased. Urbantschitsch, and, after him, Tanner and Anderson, have furnished experimental proofs of this fact. If we determine the threshold of perception for a very weak colour and superadd a stimulus, it may be of a luminous or other nature—tactile, auditory—the supplementary stimulus renders the colour more visible, as if its intensity were augmented. One sensation may have a dynamic genetic influence on another simultaneous sensation of a different nature (De Sanctis).

Within certain limits, repetition of the stimulus renders the perception always more perfect, as in the case of increased intensity. Exercise augments the perceptive power to a wonderful extent. This has been proved by Volkmann, Vierordt, and more recently by Dresslar, who carried out numerous experiments on the cutaneous sensibility, with the aid of Weber's compass (*American Journal of Psych.*, 1894). The perceptive acuteness increases rapidly from 18 millimetres to 4 millimetres of distance between the two points of the compass. This is due, in my opinion, to attention, so that the increase ceases after a certain time as the process becomes mechanical. The same tactile fineness is obtained on symmetrical parts of each arm, so that the distance is found to be diminished from 21 to 5 millimetres on both sides (increased power of attention and discrimination).

The tactile fineness is rapidly lost after cessation of exercise. Age exercises not a little influence upon the perceptive power. Under equal conditions of exercise and sex, the tactile, visual, and auditory sensibilities vary with age. Among the experiments that afford the best proof of this statement those of Zwaardemaker upon hearing appear to me to be very interesting ('*Der Umfang des Gehörs in den verschiedenen Lebensjahren*,' *Zeitschr. f. Psych. u. Physiol. d. Sinn.*, VII.). He has demonstrated that the upper limit for the perception of sounds is highest in children, and diminishes slowly up to thirty years, more rapidly from thirty to fifty-five years, and then slowly again up to eighty years. Speak-

ing generally, the extent of the sonorous scale is about eleven octaves in infants, diminishing gradually to ten octaves.

The sensation of time comes into play as a constituent element of perception, and by the experience of that sensation we form our notion of time. The sense of time, like that of space, presents very great difficulties in its psychological examination, for many reasons—among others because it is an inseparable component of perception and of thought. Whence does it arise? How is our notion of time formed and manifested? In what manner are the immediate estimation of short or long periods and the measures of time past and time to come rendered possible? In what way are the intuitions of the duration of determined psychic facts brought about in the unconsciousness, as when we fix the hour of awakening on going to bed at night, and when a hypnotized woman who has received a suggestion that is to be carried out in due time, fulfils the act suggested on the day and hour fixed in the hypnotic sleep? These are problems in psychology presenting the greatest difficulties.

We have here to deal with the question, Does there exist an immediate sense of time, or does it become formed by experience itself of the sensations and perceptions, inasmuch as we compare durations of diverse perceptions or diverse representations, series of one and the other, and the duration of the intervals between succeeding perceptions and between series of perceptions and representations? In all this it is no easy matter to say to what extent the estimations of time are immediate and direct, or represent a relation between the times of the perceptions and the times of other psychic processes, between the times of the intervals and those necessary for movements and series of movements, in relation to the spaces traversed.

It is well to take into account also another factor which has been well studied by Meumann—viz., that according as the intervals are brief or long they are void or filled, and, in the latter case, according as they are filled by continuous impressions, like those produced by the diapason, or by discontinuous impressions, such as those produced by electric sparks or by blows of a hammer, or by a complex act such as reading, the appreciation of the duration varies. So also does it vary according as the interval occurs between impressions made on different senses.

For example, the interval between two noises produced by the liberation of sparks seems shorter than an equal interval limited by two sparks seen, and appears longer than an equal time interposed between two tactile sensations. According to Meumann, there is every reason to believe that the judgment of time depends also on particular conditions of the sensory organ; this is proved by the other experimental fact that the interval between two sparks

seen with indirect vision appears longer than that between two sparks seen with direct vision.

The faculty of comparison is regarded by many psychologists as a means of understanding the intuition of time. It is evident, however, that this is not immediate, but is an effect of prolonged experience and exercise of the intellect. It is principally a fact of intelligence, as is also proved by the researches of Schumann. He, like his master, G. E. Mueller, holds that the perception of time is formed in the same way and by the same process as the representations of quality and intensity of a sensation—that is to say, by the process of comparisons—which introduce another factor of great importance—the application of attention. In fact, the judgment of the duration of the sensations and of the intervals varies with the intensity of the attention.

This factor suggests to Münsterberg the hypothesis that the appreciation of time is given by the muscular sensations arising from the adaptation of the organs of sense for the reception of the signs (in the experiments).

The judgment of two intervals of time would result from the sensations of relaxation and tension, and from the duration of these in the muscles, not only of the organs of sense, which are all furnished with muscles, but also of the neck, shoulder, and respiratory apparatus.

According to the observations of Bolton, movements play a conspicuous part in the formation of ideas of time and also of rhythm. Indeed, most individuals who hear sounds and group them together perform movements with the head, feet, fingers, or the entire body, and this sometimes unconsciously. If these movements are suppressed, so also is the rhythm (Bolton). Rhythm is only a modality of the sense of time, and seems to respond to a general law of life. Meumann, who has made a very accurate study of it (*Untersuchungen zur Psychologie und Ästhetik des Rhythmus*, *Phyl. Stud.* X.), agrees fundamentally with the doctrine of Wundt, or at least with its principal features.

All the phenomena of rhythm, according to Wundt, belong to a general psychic function, by which many impressions are grouped together into a single representation, which embraces them all, and arranges them in point of time. Here we are dealing especially with auditory images, whose analysis leads to the representation of an interval of time. The variations in intensity and quality of the auditory impressions, and the variations of the intervals that separate these impressions, and which give rise to the sensation of time, must be associated with another factor to give the impression of rhythm—the factor of periodicity. In the production of rhythm Wundt considers two primary forms, the binary and the ternary. The first is composed of a loud noise followed by a weaker, the second of a loud noise preceded and followed by a weaker.

In the case of noises, rhythm seems not to be uniformly preserved even when in reality it is ; so that some noises appear more intense than others, or the intensity is uniformly maintained, while the noises are distributed in series separated from one another by variable intervals of time.

Hence the notion of time with or without that of rhythm arises through an intellectual process. We, by a rapid synthesis, may imagine all the periods of time—seconds, hours, days, weeks, years, etc.; this takes place only by means of reassumptive symbols, such as words, which express a determined time, which, if long, cannot be represented, but only analyzed. Even in the case of this representation attention finds a place in the primary perceptions.

Münsterberg has demonstrated (*Beiträge zur exp. Psych., Heft IV.*) that, of two equal intervals of time, the one containing the elements that excite the attention more strongly seems the briefer. Thus it is that words seem briefer than sounds (of equal times), and phrases shorter than syllables void of significance.

Some psychologists, such as Wundt, Dietze, Mehner, have sought to determine experimentally the number of impressions that can be clearly distinguished in a given unit of time. Wundt has fixed the number at 12, provided they succeed one another with a certain rhythm and at intervals of not less than 0.3 and not more than 0.5 of a second. The time varies but slightly, as is shown by the experiments of Dietze, even if the total number of impressions perceived be increased up to 40, provided they are distinguishable into subgroups—*e.g.* (if experimenting with gunshots), five groups of eight shots each, or eight groups of five each.

Further, this time may vary between certain limits, not only among the subjects of experiment, but also among the different observers, and especially is it abbreviated by practice, which renders the sense of time more acute.

We have already pointed out how, by means of synthesis and analysis, we are able to represent to ourselves past times of great length—*e.g.*, many notable features in our lives. These representations are influenced in an illusory manner by the age at which we have arrived, and by the number and form of the impressions that have occupied the time gone by. 'In general,' says James, 'a time filled with varied and interesting experiences seems short in passing, but long as we look back. On the other hand, a tract of time empty of experiences seems long in passing, but in retrospect short.' In my opinion, the explanation of this phenomenon lies in the fact that states of consciousness—involving more or less disintegration of the nervous system—are variously associated with the sense of time, since the stronger they are the deeper is the impression they make, and the more readily are they reproduced. The more images reawakened on reviewing the past time, the longer does

that time appear. If to old people, and especially to those who have experienced the discipline of school and exaggerated parental authority, the first years of youth seem to have been very long and the latter years very short, then it would appear that this phenomenon should be attributed to the fact that in the young man the sensations are stronger and the memory more resisting ; while in the old man, although the former is weaker and the latter less resisting, all past sensations, as James says, form an automatic routine not rejected or completely substituted by the new.

All perceptions, however, contain yet another element which enters indissolubly into the perceptive process—the sense of space. The sense of space is developed by a series of experiments, in which several sensory organs participate. Notwithstanding all arguments on the subject, the infant in the first weeks of his life has not yet formed spacial, visual, tactile, or muscular ideas, and when he extends his hand to grasp some far-off, shining object he shows that he does not yet know how to measure distance. The intuitive estimation of distances, of the spacial relations of things, their extent and their volume, can only have origin in the synthesis of infinite elementary spacial images, to whose formation different sensory organs contribute, with the co-operation of and by means of associative paths. Every sensation, or rather perception, is associated with spacial sensations, which are coalescent with the sensory phenomenon, and cannot be separated from it except by means of psychological analysis. When we touch an object, or take it in our hands, we perceive not only the tactile qualities, but also the extent, form, and volume. If, by education, we have formed the image of a minimum unit of spacial measure, and in a given unit of time we pass through our fingers a ribbon 100 metres long with our eyes closed, we will know how to calculate approximately the length of the ribbon by mentally summing together the units of measure perceived by touch only. If, on the other hand, we move the fingers and all the upper limb in every direction over a fixed surface, we have a much better perception of the spaces covered, and judge them more exactly, because, in addition to the tactile impressions, we have the concurrence of the muscular, aponeurotic, articular, etc.

In another part of this work I have explained how visual images are formed, their motor component giving rise to the image of the form of the objects, their volume, and their spacial relations.

The displacement, on the macula lutea, of the image which is reflected on the visual field in every direction is produced by the muscular movements, which give rise to the tactile sensations that are always associated with the movements.

I would add here that the alterations in the curvature of the crystalline lens in accommodation, and especially when there is

effort at accommodation, appear to be associated with particular sensations. The changes in accommodation and the accompanying pupillary changes are not without effect on the size, intensity, and distinctness of the images.

Alterations of accommodation are associated with alterations of convergence, and, according to the experiments of Dixon ('On the Relation of Accommodation and Convergence to our Sense of Depth,' *Mind*, 1895), of Kirschmann (*Philosophische Studien di Wundt*, 1894), and of Hillebrand (*Des Verdhältniss von Accomodation und Konvergenz zur Tiefenlocalisation*, 1894), these alterations take no small part in the perception of distance and especially of depth. It is true that sensations of convergence cannot be distinguished from retinal sensations, but it seems certain that they contribute to the formation of the spacial images, and especially those of depth. Again, according to Bourdon (*Année psychologique*, 1897), the absolute knowledge of the depth of the fixed point is due to convergence.

The localization of sounds, which physiologically resolves itself into the mechanism of peripheral projection, has been variously interpreted by different experimenters and psychologists. According to Stumpf, a sound possesses a characteristic quality in every ear, a local sign that supplies material for the mental constructions of the judgments of localization by way of associations. Such judgments depend also on the differences in intensity of the sounds for each ear (Kries and Bloch); or on the variations of the action of the sounds on the semicircular canals, according to the position and space of the sonorous bodies. It is not improbable that the movements of the body, when it is directed towards the source of the sound (Münsterberg and Pierce), concur in their formation.

Here, then, we have to do with a very complex function in which there concur the impressions on the semicircular canals (*vide* the wealth of literature dealing with these organs, particularly the works of Stefani and Lugaro), the tacto-muscular impressions, and the psychic associations, with participation of the whole psychic personality. Indeed, I believe that we may support the opinion of Bechterew, which agrees for the most part with that expressed by Milhaud, namely, that the projection into space is not possible except by the intervention of the consciousness of the proper position in space and the particular spacial relations, and this in turn is founded on the synthesis of the impressions upon the organs of equilibrium (Bechterew) and the imaginative transportation of the individual personality into the most diverse positions in space, thanks to the auditory and visual spacial reminiscences (Milhaud).

We perceive also by a series of experiments whether a sound is produced very near or very far from us. Who can tell, for example, the infinite number of experiments made by an infant on hearing

the voice of its mother at the most diverse distances, and in the most varied directions ?

The nipple of the breast already constitutes a unit of measure for the infant, and it is through it that the spacial images (form, volume) of everything introduced into the mouth become formed.

Smell alone contributes little or nothing to the formation of spacial images, and those which sometimes seem to be awakened under an olfactory impression—such as one of direction—or even those of the substances or objects from which the odours emanate, are only secondary images already associated with determined odours.

Each of the other senses, then, gives a more or less apparent contribution towards the formation of ideas of space, and most of all sight and the muscular sense of the limbs, neck, and trunk.

If, however, we exclude the sense of direction and orientation, which is a more complex formation, the sense of space entering into it as one of the components, and which to a very large extent is given by the semicircular canals (and hence by the cerebellum), all the other derivatives of such sensations and spacial images become included in the tacto-muscular sphere, because they are all reduced to tacto-muscular sensations and to deep sensations coming from the articulations and the annexes.

As the elementary spacial images gradually become formed, they are not only associated, by an intrinsic law of formation, with the respective sensory image, without which the muscular sensation does not give a utilizable product (as, for example, an individual suffering from congenital blindness can readily move the ocular bulbs in the direction of the various meridians, although in the absence of the retinal images those movements do not take any part at all in the formation of spacial images), but are also associated with one another in innumerable series which the mind can analyze, reducing all the distances and all the volumes to the least perceptible, or synthetize, multiplying them to the infinite, as when we imagine the extent of the oceans or the volume of the earth or that of the sun.

What occurs in all other ideas takes place also in the formation of ideas of space. Just as the image that I have formed of the pen is not only tacto-muscular, but also visual, and, if we like, even auditory—insomuch as when writing we produce from time to time the particular noise of friction or scraping of the pen-point on the paper—so the spacial images that are formed and are forming by means of the different organs and sensory nervous apparatus blend together by association, and give rise to the notion of true space, and support one another every time a spacial judgment is required by an impression occurring through a single sense.

In this it is quite apparent that many other mental factors besides association come into play, and especially the imagination

(which, after all, can only be realized through association), attention, and that selective capacity of the mind by means of which images are categorized according to features of resemblance, analogy, difference or contrast, thus producing from chaos a condition of order in the consciousness with regard to the innumerable sensations that have gone on accumulating from the earliest days of life. The long experience of the actual sensations, associated with old sensations and with the products of analysis and synthesis, gives us the *intuition* of a larger or smaller quantity of spacial points in a single real space (synthetic judgment), besides the intuition of the spacial relations, which, after all, are only differential judgments of extent, form, and volume of objects placed in proximity or at a distance from one another in simultaneous or successive order. The same holds good for the mental formations of the relations. From this there arises also the localization of objects in definite space along with their relations according to simultaneous or successive order.

In the mental construction of the infinite relative spaces, sight and the tacto-muscular sense play a very important part, as we have already seen, the latter more especially, inasmuch as the mental spacial formations of sight are possible through the tacto-muscular products of the ocular movements, which give rise to displacements of the retinal image. From this point of view, Berkeley is not altogether wrong in attributing the formation of the spacial notions to the muscular sense alone, although severely criticised by James, and not without good reason. James, in fact, utilizing the results of the researches of Goldscheider—according to which authority the immediate perception of the movements of the limbs is given, not by the movements *per se*, but by the impressions that arise from the displacement of the articular surfaces—concludes, on the strength of a series of arguments, not always happy, that the displacements of the articular surfaces play the principal part in the formation of the sense of space. ‘The joint-feeling,’ says James, ‘can excellently serve as a map on a reduced scale, of a reality which the imagination can identify at its pleasure with this or that sensible extension simultaneously known in some other way.’

In my opinion this conclusion has a great deal of truth in it, but compared with the really important researches of Münsterberg and of Bourdon it is somewhat exaggerated. The muscular sense is in itself very complex; on the one hand it furnishes the elements for the judgment of weights and for the sense of fatigue; on the other hand, it concurs either with these elements, as Münsterberg maintained, or with the tactile elements in the formation of the spacial images.

The experiments practised on paralyzed limbs, with muscles atrophied and degenerate, for the purpose of demonstrating, by passive movements, the formation of the images of displacement

of the limbs, and hence the images of the spaces traversed by such limbs between two given positions by means of the successive articular contacts, do not give evidence in favour of the absolute value of the sensibility of the articular heads in the formation of the notions of space, because the displacement is noticed even in limbs that are completely atrophied, such as those we meet with in cases of acute poliomyelitis of long standing, where the articular ligaments are relaxed and the articular surfaces (when the patient is in a horizontal position) do not meet perfectly. These facts lead us to the conclusion that not only the articular surfaces, but also the muscles—in so far as they possess sensibility—the tendinous and aponeurotic annexes, and the integuments furnish impressions which enter as components into the notions of space (*vide* Henry, Parrisch, and others).

Perception, moreover, is a psychic fact which, like all other phenomena of Nature, is not exempt from the law of time. This might be formulated substantially as follows: Perception always requires a certain time for its fulfilment. This varies in length, increasing in proportion to the complexity of the object of perception, and diminishing with the exercise of the senses and the intellect.

This field of study was made the subject of experiments by Wundt, Cattell, Fischer, Fechner, and Delboeuf, and has been cultivated with enthusiasm in Italy by Buccola, Morselli, and others. The results that have accrued, considered either in themselves or in the application that has been made of the method of study to other psychic phenomena, as, for example, to memory, have been of very great service to psychology, and have given useful and practical indications as well as abundant promises to pedagogy.

If in combination with a chronoscope, such as that of Hipp or any other with which it is possible to measure hundredths and thousandths of a second, we use other apparatus by means of which we can produce a sound, or let fly an electric spark (as with the Gesler tubes), or provoke a tactile sensation in such a way that the moment of stimulation and that of perception are signalled, we always find that between the two moments there has elapsed a time corresponding to the nervous psychic process. This is divisible into the times for the passage of the nerve-wave provoked by the stimulus to the perceptive centre, for the simple perception either with discrimination or with discrimination and selection, and for the reaction by means of which the subject of experiment gives with a determined movement the signal of perception having taken place.

The time of perception can accordingly be divided into that of the simple perception, the discrimination, and the reaction, and, as was proved by Buccola better than any other, varies very much

with the nature of the senses experimented upon, with the intensity of the stimulus—according to the law of Weber developed by Fechner—with the number of the stimuli, with the mental state, and with the education of the individual, normal or abnormal.

I quote here some figures from Buccola's book, which to-day remains still fresh and instructive. The physiological time for the optic excitations varies from 0.222 of a second (Wundt) to 0.150 (Exner); that for the acoustic from 0.182 (Wittich) to 0.120 (Kreis); that for the tactile from 0.201 (Wundt) to 0.117 (Kreis); that for the gustatory, on the point of the tongue, varies from 0.1598 to 0.597 (with sodium chloride), and from 0.219 to 0.993 (with quinine), according to the researches of Buccola. The results obtained by Buccola in measuring the physiological time for the olfactory perceptions are very different.

The perception time increases very much when the same part is subjected to stimuli of diverse nature. Thus Buccola obtains 0.140 of a second as the time for simple contact at the base of the tongue, while for the gustatory perception of sodium chloride he obtains the much longer time of 0.543.

The intensity of the stimulus exercises no small influence on the physiological time. For example, according to the experiments of Kries and Auerbach, the sound produced by the discharge of the electric spark requires a perception time of 0.139 to 0.142 if the tension is high, and a longer time, from 0.157 to 0.158, if low.

In judging the length of these times we must distinguish the time necessary for the conduction of the centripetal nerve-wave from the periphery to the centre, and the centrifugal wave from the centre to the spinal medulla, and from the spinal medulla to the muscles of the forearm for the movements of the said limb, and of the finger that gives the signal, from that which is required by the psychic centres for the process of perception. Let us suppose, after Richet, a time of physiological perception equal to 0.150 of a second. From this we must subtract: (1) for time lost in the muscles of the arm and hand, 0.010; (2) for transmission of the nerve-current from the periphery to the centre, and *vice versa* (30 metres to the second), and for the length of a metre, 0.033; duration of the passage in the spinal medulla (5 metres to the second), 0.025. Total duration, then, of the time for the passage in the nervous and muscular apparatus, 0.068; subtract this from 0.150, and the remainder represents the time required for the process of perception.

This time is greatly augmented in compound perception (Morselli), demanding discrimination and selection. As the time of transmission, that is to say, 0.068 of a second, varies for the different senses and the different paths, the time of perception varies according to the simplicity or complexity of the object of perception, and as it calls into play discrimination or discrimination with selection.

To discern between two objects, one white and one black,

the time of perception with reaction was found by Wundt in three individuals to be—

0.050 of a second.

0.047 „ „

0.077 „ „

On adding to these two others, a red and a green, the time of perception with reaction increased to—

0.157 of a second.

0.073 „ „

0.132 „ „

In the case of the tactile sensations in two parts of the body of different sensitive power Buccola obtained the following results :

1. Simple reaction to the stimulus of contact at the tip of the finger, 0.146 ; in the lower third of the forearm, 0.149 ; if the individual had to discriminate between the two zones of the cutaneous surface stimulated, the mean time of reaction rose to 0.177 for the point of the finger, and to 0.194 for the lower third of the forearm.

If in addition to the discrimination the subject was requested to fulfil a determined volitional movement according to the site of the stimulus, the time of reaction was further increased by the selection to—

0.201 for the tip of the finger.

0.223 for the lower third of the forearm.

This general law can be applied to all degrees of discrimination and selection, and to all the senses ; it is only the figures that vary, and in applying the law to the more obvious facts of life we find it to correspond to a fact which all may observe—namely, that under equal conditions the more complicated the position and adaptations of an individual in his social relations, the longer is the time required for discrimination and selection. In this case many other factors intervene—among them the manner of feeling (the interest), which contributes to the increased pressure of the discharge from the motor centres, and the rapidity of association, which furnishes a greater number of elements of recognition, and contributes to the increase of the volitional tensions.

This other datum is closely allied to the law of Weber-Fechner—reduced to more probable terms by Ebbinghaus and by James—concerning the influence of the intensity of the stimulus upon the time of reaction. For this question, however, and for other particulars regarding the laws of the time of reaction, I refer the reader to works on psychology, being obliged to consider what we have said up to this point as sufficient for the comprehension of the phenomenon of perception.

Anomalies of Perception.—The process of sensation, or rather of perception, may become altered in various manners. Distinction is drawn between quantitative and qualitative disturbances, as well as those that have regard to the time occupied in perception and in reaction ; the latter, however, may be referred to the former. We can have a simple defect of perception when the subject is able to take in only some of the attributes of an object, thus causing the notion gained of the object itself to be incomplete. Such a defect of perception may depend upon the incapacity to notice and to register all the stimuli, which, according to general experience, may be received in a given unit of time. This condition is entirely dependent upon the degree of development of the brain, and is attributable to the fact that the nerve-elements are insufficient in number or incompletely developed, and hence are incapable of elaborating in the first place, and of furnishing in the next, a product that is of sufficient utility for the work required. Further, this may depend upon chemical conditions or other anomalies of the peripheral organ—*e.g.*, a deficiency in the retinal pigment necessary for the differentiation of colours (König). It is very difficult to say whether Daltonism is caused by such a condition or due to a central defect. Certain it is that the state of the peripheral sensory apparatus has a great influence upon the readiness and precision of perception. As regards Daltonism, some have divided those affected into groups—*e.g.*, those who are blind for blue and yellow, and those who are blind for red and green. Such a division, however, is subject to many variations. Kirschmann has observed the case of a man who was blind for green, yellow, and violet, and another for orange and indigo. Very many such varieties are found, as we are assured by the oculists who examine the candidates for railway employment. Again, it has been observed that when the perceptibility for a certain colour is defective, that for the complementary colour may remain unaltered. Idiots and imbeciles furnish examples of marked defects in perceptibility for colours, especially those of short vibration, such as green and violet.

In a large class of cases the perceptive defect arises from the fact that the elements productive of the necessary functional energy are insufficient in number, and have not reached the degree of formative evolution met with in individuals who are fully developed ; nor have the associative paths, by means of which the physiological fusion of the senso-motor components of perception is rendered possible. The same may be said of all those degenerative processes that go from cytolysis to cytoclasis, and of all those alterations giving rise to a break in the paths of communication. Sometimes insufficiency or delay in perception may arise from concentration of the attention (a condition we find very frequently in the insane)—

that is to say, from a strong cerebral potential—upon an extraneous order of psychic components (objects, hallucination, ideas, emotional states).

When only some features are appraised, they are usually those of stronger vibration, while the others, because of their more delicate and weaker vibration, are neglected.

In the case of a picture, the imbecile, the more he approaches to idiocy, will notice only some rather striking colour, or some such coarse and outstanding feature; he will be incapable of noticing as many other particulars about it as come under the observation of an individual normally developed and trained, and this results either because the nerve-elements are deficient in number, and hence insufficient to furnish the coefficient of work necessary to sum up and transform the specific vibrations of the external world, or because they are unadapted to transmit them as psychic waves, inasmuch as the transmission through the associative paths presupposes an exponent of energy (to overcome the resistance of conductors) which the nerve-elements of the phrenasthenic are incapable of producing. The nuances of the colours are not within the range of the idiot's brain.

For example, on presenting a watch to an idiot he will notice simply a mass of a certain shape and the brilliancy of the metal, and may by chance be able to associate here also the image of another body which he has seen similar to the one in question, or even the memory of the tick-tack, which is so pleasing to the idiot that he quickly puts the watch to his ear; while the individual who has been gifted with a better constituted nervous system will make out many other particulars that escape the observation of the imbecile—*e.g.*, the smoothness, the weight, the dial with the circles and numbers, etc. Now, if all these features are represented in different areas of the cerebral cortex, it is necessary that they be closely related with one another in order to give rise to the complete image of the watch, since there concur in this the visual image of colour, which is supplied by the occipito-optic system; that of form, which depends on the ocular movements; the tactile image, if the hand is made to take note of its smoothness; the muscular image, if the hand measures its size and appraises its weight by suspending it. These images are furnished by the somæsthetic and parieto-occipital systems, and also by the temporal area (the tick-tack of the watch). Should any one of these areas fail to co-operate in the harmonious work of the others, there arises in consequence a defect in perception, except in those cases of compensatory hyperfunctionality of well-developed areas such as is observed in some cases of deaf-mutism and congenital blindness.

Suppose we have a patient whose mind is absorbed by an emotional state, full of fear and anguish, as in melancholiacs, or by a

delirious idea that has invaded and taken sole possession of the field of consciousness, as in paranoics; in such a case it will be difficult for fresh impressions, unless of great intensity, to reach the visual point of consciousness, and to direct it upon the objects whence they issue, so as to give rise to normal perception. On the contrary, what happens more frequently is that the slighter stimuli are not noticed at all, or else are noticed imperfectly, and are quickly assimilated by an altered perceptive process (illusion) to the delirious mental content, since the consciousness in the process of recognition furnishes only those active images that refer almost exclusively to the delirious ideas.

Another large group of perceptive defects is composed of those cases in which destructive foci in determined seats interrupt associative or afferent paths, or suppress the function of a sensory zone in the mechanism of the cerebral mantle, and also those others in which a slow degenerative process puts out of work a progressively increasing number of anatomical components. Let us picture to ourselves an individual in whom there has occurred an interruption of the associative paths between the auditory and visual areas (by a degenerative or destructive process); the perceptive process will be defective in both areas, and more especially will there be abolished the perception of the most complex facts, as, for example, that of speech (subcortical alexia). When the nerve-cell elements of the individual sensory areas are degenerated—and under this condition the conjunction of the different elementary sensory components whence the concrete images result may certainly be possible, but the images themselves are not formed in the different areas—the recognition of an actual object is no longer possible, provided the notion existed through former perception. The result may also be an incomplete perception, with either a false or erroneous judgment, simply because the perceptive judgment has no basis more substantial than the features and relations of the objects, real or imaginary. We find this condition very often in paralytic dements, in patients with destructive foci in the brain, etc.

The most classical example of defective perception arising through interruption of the associative paths is furnished by that form of disturbance of speech known as *ecolalia*. Let us suppose the acoustic word-centre to be in relation with the intellectual field by means of associative paths, as pictured in Fig. 49. If such a path be cut through, the verbal image of the word pronounced by others is formed in the respective centre, but not being able to reach the intellectual field is not comprehended, and instead the nerve-wave turns back through the small temporo-frontal arc and puts in vibration the cortical motor centre of speech. In this case the words heard are repeated without being understood (parrot language, *ecolalia*). The same phenomenon is repeated when the intellectual field is unable to furnish the mental correspondent to the phonetic

images of speech, as is often observed in progressive paralysis and acute dementia.

A bilateral lesion of the cortex of the occipital lobes (external aspect) gives rise to psychic blindness (objects seen but not recognised), with dementia (through loss of the visual components of the intelligence). A lesion of the subcortical afferent bundle of the auditory centre will impede the arrival of the auditory waves at the perceptive centre, and will give rise to subcortical word-deafness (without alexia and without dementia). On the other hand, a lesion of the first temporal convolution, if on both sides, will give rise to suppression of auditory perception, or, if only that on the left side be injured, of speech alone. Word-deafness may be defined, whatever upholders of a twofold centre may think, as the suppression of the auditory perception of speech.

A great difference in perceptive capacity is found even among sane persons. The power of summing up the greatest possible number of qualities and relations in a perceptive unit of time, given the greatest number of aspects under which each object and each position can be regarded, is the surest foundation of what we call intelligence, and this is associated with another factor—the time of perception with discrimination. We meet with individuals who are certainly capable of perceiving, who possess the means and the aptitude to receive all gradations, modes and forms of stimuli, or the circumstances of a given position, besides all the relations of individual objects with others analogous (recognition and discrimination), and all those relations established between the objects on the one hand and the various subjective positions on the other, according to the laws of association in time and space—yet such individuals require a long time for the perception, discrimination, and judgment of the facts and their relations.

I am familiar with individuals who notice immediately any new and variable positions, any new relations to the environment, and who judge with extraordinary lucidity and rapidity, and operate according to the laws of adaptation. There are others, however, who, while certainly capable of comprehending these same relations, take a longer time to discriminate, so that frequently they adapt themselves to the new condition when it is too late to turn it to their advantage. We have here to deal, not with a true deficiency, but with a slowness. This condition makes itself very manifest in many psychopathic states.

It is easy to foresee how difficult it may be to distinguish the time of perception from that of reaction in an experimental research, since we can only estimate perception by reaction. A wide knowledge of men enables us to distinguish well those two moments of a complex psychic process. There is no doubt that many individuals, confronted by somewhat complicated positions, do not have a clear appreciation of them till after a considerable time,

although then, and then only, a rapid action follows, but is in consequence tardy, and hence less efficacious. There are others, again, who find an obstacle in the action, even when they have had for some time a clear perception of a given position. There is, accordingly, a great difference in perceptive capacity among men, and it is certain that under equal conditions those who most rapidly and clearly perceive their relations to the environment and adapt themselves thereto have the most success in life.

There is no lack of very instructive experiments bearing upon this question. All experimenters have noted great differences in the time of perception in the same individual at different times and in various subjects. In addition to external circumstances, Morselli has enumerated certain subjective ones that modify the time of reaction. Of these the greatest influence is exercised by the following: the expectant attention, the engaged attention, the precognition, distraction, fatigue, exercise, the action of stimulants, the physical state, and others.

Tambroni and Algeri, in the Institute of Reggio-Emilia, obtained mean times of reaction to the twofold tactile perception from a minimum of 0.174 of a second to a maximum of 0.196 in sane persons. These figures, expressing means, varied greatly in the experiments upon the mentally afflicted. In maniacal exaltation they were found to be longer—from 0.218 to 0.404; in lipemania, from 0.278 to 0.548. In states of mental enfeeblement the time of reaction was proportionately longer than the normal—from 0.326 to 0.395. In epileptic insanity the mean ranged from 0.271 to 0.508; the highest was given by those individuals in whom there was reason to believe that the morbid process had already damaged the mental faculties. In paranoia a lower mean was found than in the normal state (0.124), while the others approached to the normal. In mental affections, then, the time of perception and of reaction becomes for the most part lengthened. No less interesting were the experiments of Tanzi and Guicciardi on the time of acoustic reaction in healthy individuals, and in those with hallucinations of hearing. The mean of the smallest group of the latter, as compared with the mean of the smallest group of normal individuals, was as 54.7 to 101.2 thousandths of a second. This denotes that the acoustic sensory centre in paranoics possesses a higher potential than the normal. In the largest group, again, the mean was about 125.9 thousandths of a second in healthy persons, and about 140.3 in paranoics. The observers attributed this to the lesser capacity of paranoics for a constant extensive attention (*Rivista sper. di Fren.*, 1884-1885).

Tardy reaction is characteristic of all states of mental enfeeblement and fatigue (dementia, phrenasthenia, neurasthenia, hysteria), or is a result of depressing emotions (grief, fear, preoccupations), as in melancholia.

ILLUSION.—Another disorder of perception is the so-called *illusion*. This is a qualitative disturbance, and it is as well to give as precise an explanation of it as possible. An individual who judges an object differently from what it is, is a subject of illusion.

An *illusion* consists in a *disorder of perception by which the subject reproduces, in the object present, features that do not correspond to the reality, but which are reawakened by an altered associative mechanism and by an anomalous tension of certain nervous apparatus. Such a representation necessitates the action of an objective stimulus.*

If an individual, perceiving a cloud, believes he sees Christ, or the Madonna, or an angel, and describes the attitude, the movements, the physiognomy, recognising therein the features of the image which he has formed for himself of Christ, or of the Madonna, or an angel, he is an illuded person. A requisite condition to the correct definition of illusion is that there be a cloud, or, speaking generally, an object that gives rise to the impression from without, and a mental content at high tension with which the objective nerve-wave mingles and blends.

Illusion is often confused with error, with which it has many points in common. If, in a state of distraction, one sees a cloud and judges it to be something else that may bear a certain relation to a given order of ideas which at the moment is predominant in his mind, then he shall have committed an error of judgment, which is corrected immediately his attention is turned to the vague sensation that has broken in upon his train of thought.

If some night, as we are going along a lonely road, overcome by fear and apprehension lest evil-disposed persons surprise us, we hear a noise, a slight trampling, or the simple rustling of plants, and there arises within us the thought of the assassin, this is an idea correlative to that special emotion with which a determined group of images is closely bound. Such a fact is still not an illusion; but if, in a small plant, or a branch shaken by the wind, or the rustling foliage, we recognise the assassin, this is an illusion. The illusion must furnish to the existing object the subjective features previously perceived in the external world, or, in other words, preformed. Here we are dealing with previous psychic formations reproduced by the law of association each time there exists outside us a fact that takes the form of an elementary sensation common to many psychic products of diverse nature. It is evident that in such a case the elementary sensation gives rise in the field of perception to that preformed mental product which, either permanently or incidentally, has assumed the strongest associative relations with the elementary sensation. When a superstitious person passing by a cemetery at night pictures to himself spirits in the most varied forms, he puts himself in the most favourable conditions for recognising one of

these figures in a tree, a pile of stones, or a dog. This common point of elementary sensation, that can be associated with the most varied reproducible psychic formations, is what James calls a '*thing*.' Suppose a '*thing*' common to four systems, *a*, *b*, *c*, *d* (Fig. 56); its orientation, once solicited by an external stimulus, will be towards *b* or towards *c* if by any chance whatever there be determined in *b* or *c* a stronger reproductive tension independent of the sensational stimulus of the '*thing*' (*i*) coming into action. Sometimes such associative ties seem to surprise the consciousness, but in this case we must admit the existence of some old ones that have passed into unconsciousness, and instantaneous formations arising through the most diverse morbid conditions. Error of the senses examined in this respect is rather error of the intellect. The illusions produced by the expectant attention, especially if accompanied by emotional states, are explained precisely on the ground that the mind is, for

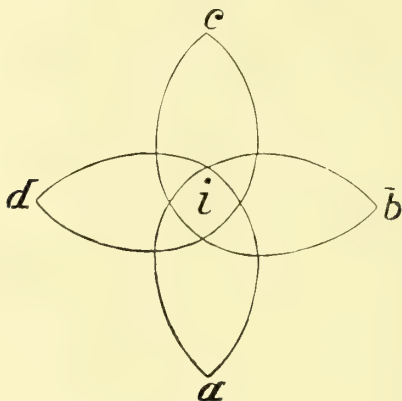


FIG. 56.

the time being, full of the thought of that object. The illusions of the ascetics who have seen the head and eyes of an image moving; those of jealous individuals who are always on the alert as regards the subject of their jealousy; those of some spiritists to whom have been suggested the phenomena that have now aroused their intense curiosity—such are the most common examples presented to us by daily experience outside the field of pathology. All the senses furnish material for illusions, which are simple or sensory, and complex or perceptive, as well as physiological and pathological. Among the examples of simple or sensory and physiological illusions is that produced by Aristotle's experiment, which consists in crossing the index and middle fingers in such a way that the inferior margin of the pulp of the latter overlies the upper margin of that of the index, and in this position taking hold of and turning a small body, such as a pea, between the two fingers, when there will seem to be two instead of one. There will be the sensation that the contact with

the index takes place above instead of below, and *vice versa* in the case of the middle finger ; and the single object touching them will seem to be in two places.

If, during a railway journey, the train in which we are travelling stops at a station, and meanwhile another train arrives, the slow movement of the latter, observed from within the carriage, gives us the illusion that our train is moving, while, on the contrary, it is at a standstill. The explanation is that the succession of the images of the passing train on the retina reawakens all those states and those other sensations that had taken place until a few moments before, while the train was in motion.

We may have a very large number of physiological illusions—and they are common to all men—especially those of geometrical figures and even of sounds. These forms of illusions have been the object of experimental researches in recent times (Knox, M. Binet, Thiéry, Heymans). Thus, for example, two lines of equal length seem unequal, two parallel lines seem to converge or diverge, angles perfectly equal seem unequal. We may take the measure of these illusions by drawing other lines establishing the parallelism of the lines or the equality of the angles. We obtain, as a result, differential angles that represent the amplitude of the illusion.

Thiéry distinguishes three groups of geometrical visual illusions—those of direction, size, and curvature. Zöllner's figure gives the illusion of perfectly parallel lines seeming otherwise. Each of the parallel lines is cut at an acute angle by small transverse lines parallel with one another, and disposed in such a way that the transversals of neighbouring lines have an opposite direction (Fig. 57).

Zöllner's apparatus (for the particulars of which I refer to the original) gives an illusion regarding straight vertical lines and the respective angles with horizontals that cut them at a right angle. The four principal lines which give rise to the illusion are 30 centimetres long, 4 millimetres broad, and 6 centimetres distant from each other. A quadrant placed at the side enables one to read the angle that the principal lines make with one another. The four vertical lines, and especially the two central, seem bent, while they are in reality straight (Fig. 57).

An analogous illusion is produced by the disposition given to the lines by the same Zöllner, and depicted in Fig. 58. Here we have a number of parallel lines, each of which is cut by transversals at an acute angle. These transversals are parallel with one another. Given this disposition, the first lines appear not to be parallel.

An example of an illusion of size is given in Fig. 59. The illusion arises from the influence that figures or lines of different size exercise upon one another. The lines a , b , and a^1 , b^1 , are of the same length, yet a , b , placed between two short lines, seems smaller than a^1 , b^1 ,

placed between two longer lines. This would appear to be an effect of confluence (Mueller-Lyer).

Analogous illusions occur with regard to weights. When bodies of different volume but of identical weight are placed side by side (experiments of E. J. Seashore, 'Measurements of Illusions and Hallucinations in Normal Life,' 1895), and are then raised, one after the other, in order to estimate their weight, the larger

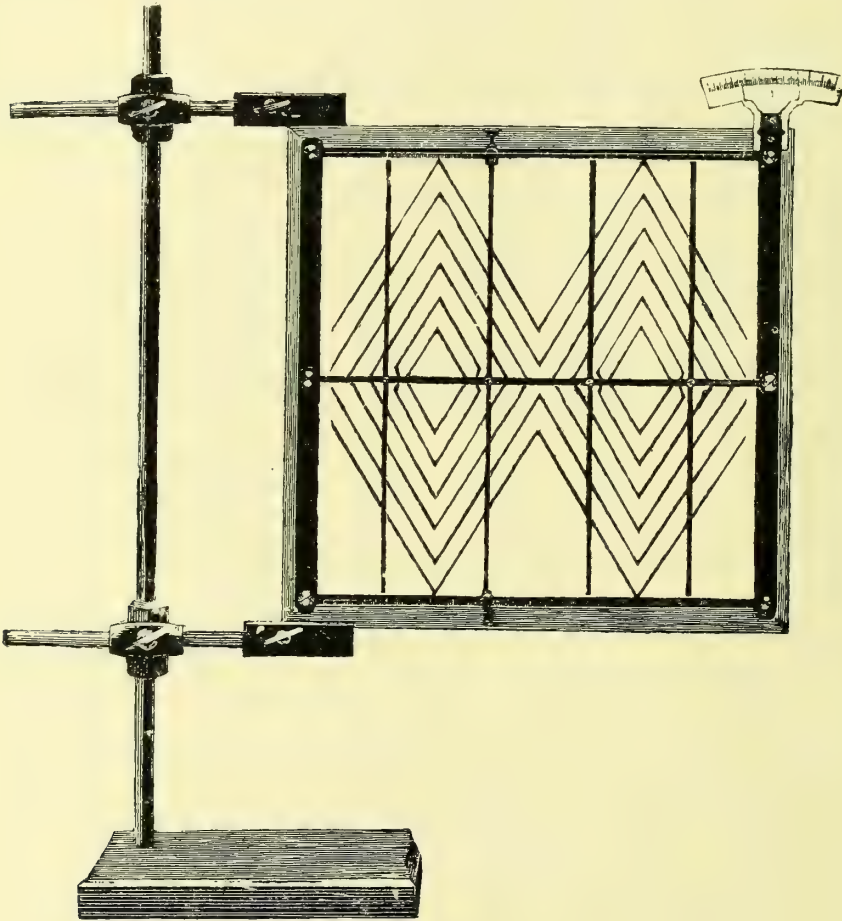


FIG. 57.

bodies always seem heavier. The illusion is stronger when the gaze is fixed directly on the bodies as they are being weighed. Here we have the influence of the volume over the weight, inasmuch as we associate weight with volume, and provide for larger volumes a greater muscular effort and a higher image of weight, while for smaller bodies we call into play a less amount of muscular effort and a lower image of weight.

It is a phenomenon of preperception or expectant attention, the

influence of which is well proved by the experiments of Grutzner. The observer is shown a series of images on the stroboscope representing children playing at leapfrog. At a given moment another series is made to pass in the stroboscope, the figure of the child in the act of leaping being now covered with white paper, and the observer, if not warned beforehand, believes he continues to see the one child leap over the back of the other.

Dresslar reports the following additional experiment: Two

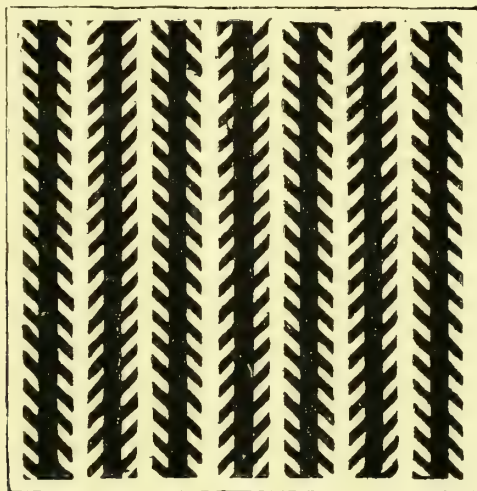


FIG. 58.

straight lines are made on a card by means of successive pin-pricks, and, meeting, cut one another. The finger is then made to run over one of the two lines approximating it to the point where they intersect. At this point the two portions of the second line are not noticed simultaneously, but first the half of the oblique forming an acute angle with the line followed, and then that portion forming an obtuse angle with it, so that the latter is felt as if it were placed

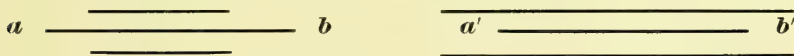


FIG. 59.

beside, instead of being a prolongation of the other. An important fact has been brought to light by A. Binet and by Biewliet—namely, that illusions are stronger and more frequent in children than in adults, a fact which serves to form some personal equations with the perceptive power.

There exist further illusions by suggestion which may frequently be an auto-suggestion, as occurs when we propose to demonstrate to ourselves a preconception, and occurs still more frequently

in young microscopists, who are induced by the authority of their professor to see through the microscope many particulars that have no existence for their eyes except in so far as described to them by the professor.

If we pass now from what I would call the physiological field to the study of the distinctly pathological illusions, we find an almost complete observance of the law that the illusion arises from preperception, a fact that is verified in all those cases in which a group of coloured and active ideas, associated with emotional states with which they are normally in relation, fill the consciousness with all the sensory images that serve in normal life to nourish and revive the thought in question.

Paranoics afford the most frequent example of this. The poor persecuted individual, overcome by the conviction of the dangers to which the wickedness of others subject him, loads his mind with enemies, sees, in the physiognomy of the people with whom he comes in contact, the *signs* of derision, of scorn, of contempt, and menace.

The paranoic lover sees in the movements of an indifferent lady, who is behind the window, the assurance of love which the lady exchanges with him unawares, or he discerns it in the smile bestowed on him as she is passing in her carriage, thus giving him a right to run after her in order to manifest the love that is consuming his soul.

The girl who is preoccupied with the beauty of her figure, of the possible defects of which she has a horror, finds such defects in the distorted mouth, the asymmetrical face, the round eyes, the contorted nose, while admiring herself in the looking-glass. The suspicious and jealous husband who watches all the movements of his wife, whom he supposes an adulteress, sees in her innocent glances or in her honest salutation to another man the irrefutable proof of adultery, and plans to get rid of her by killing her. The persecuted individual who is afraid of being poisoned believes that he perceives the presence of copper or arsenic in the salt taste of his food, and if he hears some voices from afar, decides that they are raised against him by people who are plotting his destruction.

Some visual illusions of size may be of peripheral origin and in reality muscular. I have referred to the case of a young man who, on seeing his brother after a long absence, was surprised to find him very small in stature. Another patient in my clinique saw his horses small and lean, and was grieved thereat. Here we have the muscular element of perception coming into play, and there is no reason to reject the idea that the defect may be in the peripheral apparatus.

Further, we have tactile and muscular illusions occurring even in amputated limbs, in illustration of which observations have

been made by Weir Mitchell, Lemos, Rizet, Charcot, Abbatucci, and, more recently, in a very interesting article, by A. Pitres. We have here the persistent sensation, in some cases, of the existence of the lost limb; kinæsthetic sensations, sometimes painful, referred to parts of the body that have been amputated for some time; momentary sensations in the *phantom limb* by exciting the corresponding nerve plexus with electricity, as in the case that came under Weir Mitchell, who describes the great surprise of the patient, whose shoulder he had disarticulated some time before, and who cried under the stimulation, 'Oh, my hand, my hand!' Occasionally there are illusory voluntary movements of the *phantom limbs*, as sometimes provoked by excitation of the nerves of the stump. All these illusory sensations of those who have suffered amputation are due most frequently to excitation of the nerve-filaments in the cicatrices, which reawaken old images in the respective centres, or determine their formation by association in the field of the consciousness.

One phenomenon that may be placed among the illusions is that which goes under the name of *coloured audition*. In Italy interesting observations upon it have been published by Lussana, Verga, Ughetti, Mendoza, Mirto, D'Abundo, and others. It is very common amongst healthy persons (about 20 per cent.) and blind persons, but is much more frequent in the blind who once had vision than in those who never possessed it. This condition is found in 12 per cent. of the blind at the most (Philippe). The phenomenon consists in the reawakening of a colour under the acoustic impression of vowels, words, or sounds of instruments. Sometimes the colour is provoked by touch (the form of an object). This last phenomenon is met with in some blind persons in the case of things they have never seen, while it is absent in the case of things they have seen and the memory of which they preserve.

The phenomenon is not easily interpreted, but as there is no constant feature, and as each of those who exhibit the phenomenon affords an example of diverse associations, we must deduce from this that it is principally a fact of association. For example, sometimes the sound rearouses the colour of the instrument producing it; at other times it is the earliest associations that have arisen in infancy during the rapid evolutionary progress of the mind. A servant of the author, like all the common people in Italy, used to call *turchino* (azure) *blu* (blue). Since then, the vowel *i* of the accented syllable of the word *turchino* has always made the author see *blu*, as *o* makes him see *rosso* (red), and *u* *nero* (black), vulgarly *nero-fumo* (soot). In this case the association of the vowel-sound with the colour, during the period of mental formation, is evident.

The diphthongs evoke the colours of the two vowels forming them. The strongest combinations are found between words and

colours, and the fact that the same word or vowel arouses different colours in different individuals, and that the opposite word, as in a case of D'Abundo, gives sometimes the contrary colour and at other times the same colour, confirms the idea of the accidental association.

Accordingly, it is caprice or chance that establishes certain associations between sounds and colours.

Another sensory disorder of a more serious nature, which at bottom is closely related to the true illusion, if indeed it may not signify the same thing, is *hallucination*. A hallucination is a *subjective perception*. While in the case of the illusion it is the object that is badly perceived, because the subject furnishes it with the features of which the consciousness is full, and which do not belong to it, in hallucination the external stimulus is absent to begin with, and the reproduction originates primarily in the sensory centres from images which have perhaps at some former time been formed and registered in their respective centres. These images, however, may result from features furnished by various sensations at different times, and now associated together by the creative power of the brain in a concrete image in the same sensory areas in which images are formed and registered by a physiological process; here these become rearoused by an intrinsic activity of the nerve-elements, and are projected outside, or, as it is said, objectivated.

All sensations leave a residuum, a trace which we call an image, and we think and operate with the concurrence of all the more or less apparent mental capital of images that have gone on accumulating, and are always capable of being reawakened and represented, in order to become associated with the new material that the brain receives and assimilates from the external world. If we are making our way towards a known locality, we picture to ourselves the route, the difficulties to be overcome, and the places through which we have to go; if we are preparing to go to hear a grand opera of which we are fond, numerous images of former spectacles come up before us, and the most stirring movements of the score are called to mind; if we are preparing to deliver a lecture, our mind represents to itself, in the quietude of its dominions, the words and phrases that give precise form to the fundamental thought of the lecture. In pathological cases, the reawakening of the images is much more intense and much more vivid, so much so that they become projected externally as true actual sensations, which, though resulting from a subjective process, are referred to an object present.

The product of the hallucination, observed externally, as though the object which it represents had existence, surprises the consciousness. Even within physiological limits we find a diversity in the degree of vividness of the images. Artists, for example, possess the faculty of representing to themselves in an especial degree colours of the sensory images. It is not an uncommon thing for a painter

or a sculptor to produce a lifelike reflection of the figures that he wishes to reproduce on the canvas or in the marble, as though actually seen, while in the generality of men the memories are less vivid and more intellectual.

One of the most distinguished and esteemed Italian artists, who was for some time a patient in the asylum at Naples in 1883, when engaged in painting or drawing a portrait, used to take up his position at a distance of 4 or 5 metres in front of the canvas and there prepare his brush and colours, from time to time casting an acute and penetrating glance at the canvas, as though he wished to find in it the point of accommodation of his eyes in order to reveal the image which he almost saw projected upon it; he would then grasp his brush, run towards the canvas, and execute three or four rapid strokes after the manner of a fencer, then he would suddenly retire again, and the process would be repeated as before. In this way, after seven or eight assaults, the figure was beautifully delineated, and already it seemed as though a breath of life were infused into, and came potent from, those formless colours.

Cases of isolated hallucinations are found in individuals who present no other morbid manifestations, and who at the most may be considered neuropathic. I am compelled to regard as untrue, or at least as greatly exaggerated, the results of the statistical inquiry of Edmund Gurney, who says that in every ten persons there is certainly one who has had at one or another time in his life a true hallucination. This proportion is not attained unless we enumerate infants and children amongst the *persons*, and include the hallucinations that occur during sleep (hypnagogic). On the other hand, it would be well-nigh impossible to calculate amongst the number the dreams that are prolonged for some time into the waking state. It is certainly true that many healthy and highly-talented men have had a hallucination at one time or another. The hallucination of which I am speaking differs from pathological hallucinations in this respect, that, in the healthy individual—often highly intelligent—in whom the process of ideation takes place normally, the personality offers resistance and maintains its integrity, so that the recognition of the pathological fact is prompt. Andral, when a student of anatomy, was profoundly impressed by the condition in which he found a cadaver, lying dismembered and in process of putrefaction, in the dissecting-room. While taking a walk in the evening he saw the cadaver and felt its stench; he recognised, however, that it was a physiological fact, and attributed it to the vivid impression that the sight of the cadaver had made upon him.

Hallucinations were more frequent in olden times than at the present day, yet there is no lack of quite recent examples.

Quintus Curtius Rufus, while walking one evening, saw a lady of extraordinary height and beauty, who told him she was

Africa, and that one day he would become Proconsul in that country.

The Christian religion owes not a little of its triumph to the hallucination of Constantine, who, when marching towards Rome at the head of his army, saw a flaming cross above the disc of the sun with the inscription, in Greek characters, *ἐν τούτῳ νικᾷ—in hoc (signo) vinces*.

Spinoza tells how, awakening at daybreak one morning from a profound sleep, the images that he had seen in a dream reappeared before him with such vividness that it seemed to him they had been real; among others, the figure of a Brazilian negro impressed him, but, he said, 'he was completely unknown to me.'

It is recorded by Lombroso that Van Helmont declared he saw a guardian angel appear to him in all the most important circumstances of his life.

Savonarola used to say his visions were true, and, among other things, asserted that he had seen, in the sky, a hand grasping a sword on which were written the following words: 'Gladius domini super terram citu et velociter' (Pasquale Villari).

Cromwell, while lying tired and sleepless in bed, had an apparition of the gigantic figure of a lady, who told him he would be the greatest man in England.

The lamented Andrea Verga described to the author the hallucination he had, while in bed one night, of a skeleton which, lying at some distance, commenced to move in the direction of the bed; as it approached, the different bones separated one from another and, having reached the bed, clambered over the bedclothes.

Persons with hallucinations, stories of whom abound in all ancient history, and especially that of the religions (*vide* the recent publication of Schiattarella, *Miracoli e Profezie*, 1899), may be divided into three categories. The first is composed of men whom we now regard as delirious, but in relation to their own times their hallucinations represented the dominant ideas, and especially those of an emotional nature, and at the time they would be considered at most as subnormal. A true epidemic of such hallucinations occurred in the Middle Ages, which were eminently emotional and superstitious. The second comprises those who presented, in addition to the hallucinations, other symptoms of mental affection, which, as a whole, produced a profound alteration of the personality. The third comprises those in whom the phenomenon was quite solitary, and quickly recognised as a fleeting episode (like the hallucinations of Andral, Cromwell, Verga, etc.). The true patient of modern times regards as real that which is the result of excitation of his sensory centres, and accepts it as though he received it from the external world, while the healthy individual soon notices the error, and does not assume to be real what he knows to be a subjective product.

Hallucinations may in consequence be as numerous and of as different nature and content as are the images that are fixed in the brain—and all the possible combinations of these that may result from a process of decomposition and recomposition in the most varied manner—and as are our different senses. There are visual, auditory, olfactory, gustatory, tactile, verbal, kinæsthetic hallucinations, and so on. The auditory and visual hallucinations are best defined and most powerful—the former perhaps more than the latter—just as hearing and sight exercise a stronger influence in the development of thought than smell, taste, and touch.

Different degrees of hallucination have been described, and rightly so.

Anyone who has experience amongst the insane knows how various the intensity of the hallucinations may be, according to the mental constitution of the individual and the form of the malady. In the same affection, as in paranoia, the hallucinations are frequently less intense at the beginning than at a more advanced stage; they are the so-called pseudo-hallucinations. So also is their content variable. In this regard it is to be noted that the patients sometimes complain of noises, hissing, whistling, ringing of bells, and rustling in the head; later on, the noises assume the character of human voices, and then of words. These are heard in the head or other parts of the body as internal voices, and then we speak of true verbal hallucinations, which are the same sensor-motor and acoustic verbal images as are aroused in the process of internal diction, only more coloured and forcible than is the case in physiological internal diction. At a further stage these images are projected into space, though yet lacking that vividness that is characteristic of well-developed hallucinations. So also the distance is variable. Some hear the words close to the ear, some at a short distance, others in the room, or behind the walls, or under the floor; others, again, hear them at a considerable distance, in the streets, etc.

Sometimes these voices or words are observed in the tongue, in the throat, in the abdomen, or in other parts of the body. They are the so-called psycho-motor verbal hallucinations (Séglas, Tamburini, and others). A female patient in my clinique, an old hypocrite, has for many years heaped imprecations on her tongue and prayed and supplicated to have it taken from her, because it says so many unseemly words which she does not wish to say, and which are in contrast with the moral custom of her whole life. They are the tacto-kinetic images of the centre of Broca, which are projected into exactly the same organs accustomed to the articulation of speech. The interpretation of words heard in other parts of the body is more difficult, unless one is willing to admit a central irradiation of the increased potential of the zone of language into the surrounding somæsthetic zone, and hence an associative syn-

thesis of the contributing zones, with irradiation of two different but fused products and resonance, in the consciousness, of the predominant product, which is speech, with distant irradiation into other parts of the body.

In my opinion, however, we have not always in those cases to do with kinæsthetic verbal hallucinations. In some cases, as in the above-recorded woman, whom I have always under observation, the sensations in the tongue and other parts of the body are associated with true verbal auditory images in such a way that I am convinced that in many cases, if not in all, we have to deal with mixed kinæsthetic-auditory hallucinations, with the simultaneousness—incapable of analysis by the patient—of the tactile or kinæsthetic sensation and of the voice heard, rather than with true kinæsthetic hallucinations.

As in the case of spoken language, so also we may observe visual hallucinations of written language or kinæsthetic-graphic hallucinations, which give the patient the conviction of having written words which in reality were not written.

The hallucinations are sometimes provided with a strong excitomotor power. I shall have occasion to return several times to this phenomenon in the third part of this work in dealing with various forms of psychoses. At this point, however, I am constrained to mention the importance of the fact, and to impress it upon the mind of the reader with an example that came under my observation in the Villa di Salute at Palermo, and was reported in my lectures on *Frenosi Sensoria* (Vallardi, Milan, 1897). The following is a brief summary of the history of the patient :

Observation 1.—Ven. G., from Lercara, age forty-three, married, with three sons, shoemaker, uneducated, Roman Catholic. He was admitted to the Villa di Salute of Palermo in May, 1899.

A maternal uncle, frequently homicidal, committed suicide to escape falling into the hands of the public authorities, against whom he defended himself for a whole night ; a paternal uncle led a solitary and eccentric life ; a brother is taciturn ; his mother has lost her memory at eighty years of age.

His mother had a bad pregnancy in him, and gave birth to her son with considerable suffering. He showed nothing of note in the earliest years of his life. At the age of eleven he commenced to work in the sulphur mines, where he had to do very heavy work with inadequate nutrition. During the time he was at this work—that is, till about twenty-five years of age—he does not appear to have been the subject of sexual excess or abuse of tobacco, nor to have been a masturbator to any great extent. After marriage he took up shoemaking, and he then appears to have commenced to drink wine in large quantities, so as to have been frequently drunk.

He has not suffered from any illnesses of importance except small-pox, at about the age of ten. He is of a credulous nature.

He gives the following account of the beginning of his illness : About the middle of April he was offended by a lady, who called him a drunkard. Indignant at this, he hurled abuses at that lady in return, and she thought it well to avenge herself by referring the matter to four local peasants, of whom Ven. G. was so much afraid that he remained hidden in his own house for three days. One of these nights, the devil appeared to him in a dream and said : ' Take your choice ; either cut off your right hand or be murdered by the four men.' In order not to lose his life and soul, he thought, still dreaming, that he would content himself to live minus one hand ; then, having awakened, he continued to see the devil beside him, enjoining him to cut off his hand. Terrified by the vision, he was uncertain whether to execute the order or not, either through the inhibition produced by fear or on account of the pain he would have to suffer. He raised an objection to the diabolical vision, from which he received a further injunction, with the assurance that he would suffer no pain. It was then that he gave a look to an old saw, ' and, aided by the devil himself,' to use his own words, he sawed off his hand without feeling any pain, for his arm seemed ' as though made of wood.'

As soon as he had completed the mutilation of his hand he felt pain, and, terrified by the amount of blood he was losing, attracted attention by his loud shrieks. A terrified and stuporous state was suddenly established, and in this condition he was conducted to the Villa di Salute.

Notwithstanding that such subjective images are projected outside, they do not all possess a strong emotional power. Many patients are almost indifferent to their hallucinations, as though they had a suspicion of the sensory error. Those forms of hallucination correspond to those of Doctor N. L., of whom Kandinsky speaks. For the clearer understanding of the reader, I report the case as given in James's book.

' Dr. N. L. heard one day suddenly amongst the voices of his persecutors ("coming from a hollow space in the midst of the wall") a rather loud voice impressively saying to him : "Change your national allegiance." Understanding this to mean that his only hope consisted in ceasing to be subject to the Czar of Russia, he reflected for a moment what allegiance would be better, and resolved to become an English subject. At the same moment he saw a pseudo-hallucinatory lion of natural size which appeared and quickly laid its fore-paws on his shoulders. He had a lively feeling of these paws as a tolerably painful local pressure (complete hallucination of touch). Then the same voice from the wall said : "Now you have a lion—now you will rule," whereupon

the patient recollected that the lion was the national emblem of England. The lion appeared to L. very distinct and vivid, but he nevertheless remained conscious, as he afterwards expressed it, that he saw the animal, not with his bodily, but with his mental eyes. Accordingly he felt no terror even though he felt the contact of the claws. . . . Had the lion been a complete hallucination, the patient, as he himself remarked after recovery, would have felt great fear, and very likely screamed or taken to flight.'

Sometimes the acoustic verbal images of the thought itself are projected outside, in such a way that the subject hears all that he himself thinks, repeated in speech.

This phenomenon is not difficult of interpretation. A few years ago I observed a very telling example of it. It concerned a young Sicilian who consulted me several times by letter, then came to me in person, and remained in Naples for some time. He was of good intelligence, and discussed his business affairs faultlessly. For some time, however, he had been surprised at hearing all that he thought, like a distant, indefinite echo. By degrees, after the space of a year or thereabouts, the echo became clearer and also nearer; and while from the outset he was almost convinced that it was due to a cerebral phenomenon, when he commenced to hear the words that he thought uttered distinctly in the environment, he became greatly preoccupied and unsettled, from the fact that it led him to the conviction that other people knew all he was thinking.

Urged on by the continuance of this state of affairs, which was leaving him ever briefer periods of peace, he commenced to suspect that other people had found a mode of reading his thoughts, and had even the audacity to repeat to him the words with which he himself clothed them. This suspicion made him very irritable and sometimes threatening towards the members of his own family.

The important thing to note in this case is that for a long time he preserved normal the consciousness of the malady, understanding that it was impossible, or almost so, that others could read his mind, and came to me to get a reliable confirmation of his conviction that the phenomenon was not a matter of wickedness on the part of others, and that accordingly it must have been morbid. It was only when all methods of treatment seemed useless that he formed the false conception that other people were 'stealing his thoughts.'

Hallucinations are frequent phenomena of sleep. It has been remarked that during sleep the activity of the brain continues, and images follow images, and scenes follow scenes, often without order and with weak associative ties, withdrawn from the restraints of logical succession in time and space. During sleep the *ego* no longer offers any obstacle to the uncurbed imagination, as it does when in relation with the external world.

Thought, during sleep, resembles the dream that a man sometimes has in his ecstasy when awake. An example of this state (besides the large number that one may find in Mantegazza, '*Le estasi umane*') is afforded by the ecstasy of Luther. 'On the day of Friday,' says Luther, 'I was in my room engaged in a fervid prayer, and I was contemplating in my mind how Christ was nailed to the cross, and how He suffered and died for our sins. There appeared to me on the wall a brilliant image of Christ, with its eyes fixed upon me as if it were the Saviour Himself. I reflected that it was an illusion. . . .'

The dream may be considered as the hallucination of the sleeping person, or, if so preferred, of what Tissié calls the *splanchnic ego*. It may therefore continue until the awakening, when the consciousness, being rearoused, should assume its natural dominion over the *splanchnic ego*. In this case the consciousness feels the action of the dream like a psychic wound (De Sanctis), and accepts the content of the dream as an external stimulus, real and active, with all the conditions of an objective sensation—with its emotions, its attractions, its repulsions, and its dynamo-genesis. The emotion produced by the dream exercises a strong influence in these cases, as Féré and Toulouse have rightly pointed out.

With drowsiness of the consciousness and attention, the activity of the sensory areas of the cerebral cortex is exaggerated, and on this fact depends the reawakening of images previously stored up and associated with one another, or new and momentary formations arising spontaneously or provoked by stimuli which naturally remain outside the threshold of consciousness, but exercise an efficient action on the sensory centres. Thus it was that the iron of the bed supporting the neck of Moury while asleep, provoked in him the dream that he was being guillotined. Max Simon mentions the case of a geographer who was studying a chart of the lakes of the interior of Africa, and who, on falling asleep, dreamt that an immense geographical chart lay open in front of him, with currents of bluish waters. He was perspiring; the coverlets were the geographical chart, and rivulets of perspiration were the currents of water. Thus also, one understands how, when the stomach is full, one may dream that a hostile hand is compressing the chest. Hypnotism also affords a proof of this. In hypnotic states the directive influence of the will ceases, and the ordinary conscious activity is gradually reduced and confused. For this reason, as by a law of compensation in the distribution of the nervous energy among the different areas of the brain, the sensory function is excited to a much higher degree by slight peripheral stimuli.

In these cases we have, as a rule, to deal not with monotonous hallucinations that surprise the consciousness with their forcible insurrection, but rather with hallucinatory scenes acted and

sometimes coherent, true reminiscences sometimes, in which a connected series of images comes into play, as when the individual abandons himself rashly to the suggestion of his favourite desire.

Some subjects, badly endowed, predisposed to mental affections, presenting a very unstable cerebral constitution, with a consciousness that is easily disturbed, are orientated towards a new mental content by the hallucinations occurring in a dream, so that the sensory effect remains even after awakening. In this case also, the consciousness is surprised, and in a short time is altered by the new content which is quickly assimilated, inducing therein a new order of ideas and a new orientation in its intrinsic constitution and its relations with the environment. If such dreams are repeated in the same manner on successive nights, as frequently happens, an organized delirium becomes set up, and is consecutive to these hallucinations. These are the so-called *hypnogogic* or *oneiric hallucinations* described by Regis. Sometimes they are unilateral, and they are more frequently so than is held by most people. In Italy, Seppilli has called the attention of clinicians to this fact. They are principally visual hallucinations (in the right or left visual fields), or auditory hallucinations; sometimes they are tactile. I have observed several cases of this nature. One patient, five minutes before a severe epileptic accession, had the hallucination of the grotesque figure of a black man, of a demon, as he said, at his right side, and it persisted until he lost consciousness and fell. The side that was first affected by the convulsion was precisely the right. In another case, a young man who presented the signs and symptoms of a cerebral neoplasm, with left hemianopsia, was surprised by visual hallucinations in the field of the hemianopsia.

In asylums it is not uncommon to come upon a subject of hallucination who, in conversing with his interlocutor, turns his head always to one side. He hears the voices, and sometimes sees the persons who are addressing him on that side. Regis is of opinion that unilateral hallucinations are an effect of irritation of the peripheral organ. Toulouse is more cautious, and does not exclude the central origin of them. He seems to be right, too, when we consider the fact that in some cases, as that to which I have referred, the hallucinatory images are projected upon the field of hemianopsia.

Let us now inquire into the mechanism to which the hallucinations owe their origin. This question may be regarded from two different standpoints—that of the anatomical substratum and that of the dynamism. I shall discuss briefly the various doctrines held regarding the former. With these, the names of not a few authors are associated. Some have maintained that the hallucinations arise from stimulations of the peripheral elements of the specific nerve—in the case of visual hallucination, the retina or

more particularly the rods and cones ; in the case of the auditory, the expansion of the fibres of the acoustic nerve, etc., in the internal ear (cochlea, organ of Corti). This doctrine I hold to be true within certain limits, for this reason, that those same physiological molecular modifications which we must recognise in the peripheral receptive elements, when these are subjected to the action of physiological stimuli, can likewise be provoked when the peripheral nerve expansions are exposed to the actions of abnormal stimuli, thus rendering possible the reproduction, in these elements, of analogous nerve waves, which, arriving at the respective centres, may there provoke those same changes that first gave origin to the image. I have observed a gentleman, well known in high commercial circles, who, after a hæmorrhage into the retina, became the subject of visual hallucinations (persons, animals), of which he always took exact account, and which gradually disappeared in proportion as the extravasated blood became absorbed. In general, however, the artificial irritations of the peripheral nervous expansions reproduce not exactly the concrete images of objects, persons, and places, but elementary phenomena of the same sensation. If we press the ocular bulb in the dark, or stimulate the optic nerve with electricity, we see flashes of light, circles, discs, and similar phenomena (phosphenes). Excitations of the acoustic nerve provoke tinklings, whistlings, and noises, as when the acoustic nerve is stimulated with the electric current.

Nevertheless, if the abnormal stimulation is prolonged or frequently repeated it may, by means of the ordinary paths, augment the dynamic potential in the respective cortical zone, in which case it will give rise to hallucination. I believe that abnormal stimulation, not only of the peripheral expansions of the specific nerves, but also of their trunks, gives rise to the same effects.

No other explanation can be given of the visual hallucinations of those who have been blind for a long time as the result of grave affections or enucleation of the ocular bulb. The same thing may be said of the hallucinations of individuals who are deaf through affections of the internal ear. By hallucinations of peripheral origin, then, we can understand only those provoked in the respective sensory centres by abnormal and prolonged stimulations of the peripheral nervous apparatus. In all these cases there is discoverable a vesanic constitution of the patients.

I consider there is no anatomo-pathological or experimental proof in support of the doctrine according to which the optic thalamus would be the seat of the hallucinations. This doctrine, which is most strongly advocated by Luys, may be placed alongside the preceding, as we shall see a little further on.

From what we have written in the first part of this work and in the first pages of this chapter, one can easily deduce, without

entering farther into details, that the peripheral, like the sub-cortical stimulations, do not produce hallucinations, except in so far as they augment the potential of the perceptive areas which are the seat of formation and preservation of the images.

We must now take up the question whether the hallucinations arise by a primary abnormal excitation of the sensory areas of the cerebral cortex, or whether they are of intellectual or ideative origin. The present-day notion of the sensory areas, and the significance attributed to them of centres formative and preservative of the images, force us to admit that the hallucinations can only have their origin in the sensory zone. In this matter I support the hypothesis of Tamburini, who has been the first to utilize the existing knowledge of the cortical sensory centres, so as to assign a more stable physiological doctrine to our ideas of the hallucinations. Hallucinations are phenomena whose organic substratum is in every case the respective sensory area of the cortex. The more or less evident alterations that we find, then, when we have the opportunity of making sections of the brain of a subject of hallucination, are an irrefutable proof of the truth of this doctrine. I could report many cases in support of it, but deem it sufficient to give one that has been the object of observation quite recently.

Observation 2.—Bal. P., fifty-five years of age, was admitted to the wards on January 27, 1901.

Twelve years ago he contracted syphilis. He has undergone long and assiduous treatment, and remained well until a year and a half before admission. In the summer of 1899 a small tumour made its appearance in the upper part of the right parietal region, and when incised a caseous substance came from it. It must have been of gummatous formation. A few months afterwards, clonic contractions commenced in the right upper limb, and, to a less extent, in the upper muscular region of the facial nerve of the same side. These convulsions have been repeated at longer or shorter intervals in identical manner. Lately, the convulsive attack has been accompanied by visual sensory disorders with ideas of persecution and intense motor agitation. On this account he has been brought to the asylum.

The objective examination has given the following results: Tactile sensibility is normal on the right side, but markedly altered on the entire left half of the body. The patient does not always notice small contacts made on the left side, and even when he does, does not localize them with the same precision with which he localizes them on the right side, although employing always the right hand to indicate the points touched on one or other part of the body. On examination with the æsthesiometer the difference between the two sides becomes more evident. These disturbances

of the tactile sensibility increase from the root to the extremity of the limbs, where they are most marked.

The patient does not notice the slight differences of temperature of different bodies applied to the surface of his body on the left side.

The sensibility to pain is slightly diminished towards the extremity of the left upper limb. Muscular sensibility is markedly altered on the left side. The stereognostic sensibility is abolished on the left side. The patient does not succeed in defining an object placed in his left hand, no matter how much he handles it. With the right hand, on the contrary, he perceives and distinguishes even the smallest objects.

With each nostril he distinguishes different odours well.

The visual strength is almost normal; the chromatic sense is normal. The visual field is not hemiopic, but is diminished in the two left halves.

The auditory sensibility is preserved. The patient frequently notices strange noises in his ears—sometimes it is the booming of his own voice in the organ of hearing; at other times it is whistlings, hissings, or sounds of falling rain.

The patient presents a profound change of the kinæsthetic sense. He is continually requesting to be visited by the doctor, because it seems to him that his respiration does not go on regularly, that his heart is affected, and he suffers from anxiety and malaise.

The patient feels cold more than he ought, and piles on as many bedclothes as he can have.

All the cutaneous reflexes are abolished, with the exception of the abdominal reflex, which, however, is hardly perceptible.

The conjunctival reflex is weak on both sides, that of the auditory canal is absent, that of the Schneiderian membrane is preserved, as are also the rectal, the vesical, and the iridean.

The patellar reflexes are unequal, the left being more accentuated (examination was made immediately after a convulsive attack). On repeating the examination after the lapse of a few days, no marked difference could be made out between the two sides. The reflex of the tendon Achilles is present, and the tendon reflexes of all the muscles of the upper limb can be provoked.

The permanent psychic disorders of the patient consist in a weakness of the mental functions, not very pronounced, especially of the power of attention, for which reason the patient is unable to undergo a long interrogation or a minute somatic examination that requests his attentive co-operation without being tired. The perceptive process is almost normal, and memory is normal, as is also ideation, delirium being absent.

The transitory psychic disorders which recur periodically along with the Jacksonian accession are more important. While imme-

diately before the accession the patient notices formication and a sense of heat or cold in the left upper limb, during and after the accession he has vivid visual hallucinations and illusions. These have this characteristic, that the patient sees strange physiognomies, and men disguised and gesticulating in a scoffing manner at his expense, not in every direction of the room he occupies, but only on his left side. Frequently, after the accession, the reaction of the patient to these abnormal sensory products is rather lively. Lately he is convinced that these disturbances accompany the convulsive accession, and does not concern himself about them; but at first his consciousness was perturbed by them, and he believed himself the victim of persecution and insults.

Preoccupied with himself and his health, in an apparent and superficial expansiveness, he is egoistic and perfectly indifferent to all that lies without the sphere of his immediate wants. He is always asking something to eat, and two rations of food are scarcely sufficient to satisfy him. His stomach being filled, and having consulted the doctor three or four times concerning his present misfortunes, he does not preoccupy himself with anything else. He wishes to be assured that his death is not near; he has some interest in living wherever he may be, within or without the asylum. He says he wishes to be discharged, but he does not really desire it. His family has no attraction for him. His wife has lived separate from him for some time; his sexual function is almost dormant, and accordingly he has nothing to request from the world without.

In the asylum he is very correct.

On January 30, 1901, he seemed to see the faces of the members of his family disguised, and deriding him; then he saw dead bodies round him, masks, wounded persons, men in threatening attitudes, etc., and he heard hissings, noises, and tinklings.

On April 18, 1901, he had renewed attacks of the Jacksonian type, which commenced in the muscular territory of the left facial nerve, and extended to the limbs of the same side. The visual hallucinations were repeated.

The diagnosis was made of meningo-cerebral gumma, and the patient was put under a rigorous and extensive mercurial treatment.

Notwithstanding, the attacks were repeated with great intensity on April 18 and 21. Purulent bronchitis developed. Further accessions occurred on the 23rd; death.

The conditions found at the autopsy were as follows: On the inner table of the cranial vault, at a point corresponding to the right parietal eminence, were two areas of gummatous ostitis and other small ones in the neighbourhood. The cranial bones were very thin and transparent on the left side, but thicker on the right side. The dura mater on the right side was greatly thickened, hardened

and adherent to the underlying layers ; at the points where it was incised it was seen to be occupied by hard, yellowish gummatous nodules and plaques. The lesion extended from the foot of the frontal convolutions to the occipital lobe, occupying principally the parietal lobe, from which a bridge was thrown to the first temporal convolution (Fig. 60). The other half of the dura mater was perfectly free ; the left hemisphere showed no specific alteration of the cerebral arteries. The spinal medulla presented no appreciable alterations.

Such a finding explains all the symptoms ; the nodules on the Rolandic zone were the cause of the Jacksonian attacks ; the diffusion over all the somæsthetic zone gives the reason of the profound disturbances of kinæsthesia and of the hypochondriacal condition ; the diffusion backwards on the occipital lobe and the

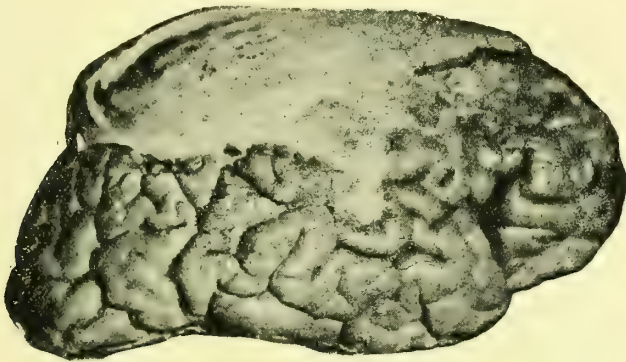


FIG. 60.

projection upon the first temporal convolution are to be regarded as the immediate cause of the auditory and visual hallucinations.

Whether hallucination may also be of intellectual origin—that is, secondary to ideas which, by having reached a high degree of intensity, may excite more strongly than normal the sensory areas with which they correspond, through the same associative paths by means of which, in the formative process, the sensory phenomena are primarily associated with the ideas—is more difficult to decide. Such a hypothesis, however, is supported by clinical experience.

The correspondence between hallucination and delirium is as undeniable as between perception and thought.

The influence of these two psychic factors upon one another is reciprocal. A phenomenon observed excites the creative capacity of thought, just as the latter finds confirmation in the sensory proof of the facts. This law is observed fundamentally in pathology. In numerous cases the first phenomenon with which a delirium manifests itself is a hallucination, let us say auditory, a voice, which is

then followed by words that are quite distinct and phrases containing insults, threats, and so on, which the patients sometimes recognise at first as a new production of their brain, for which they go to doctors for advice, and later on, if the disturbance persists, they interpret the hallucinatory content by forming false judgments—logical deliria with respect to the ideative and emotional content of the hallucinations. Such deliria are consecutive to the hallucination. As we shall see in another part of this work, the hallucinations in such cases are persistent, and have a uniform content, which is necessary, in the majority of cases, to induce a false direction of ideation on a prepared emotional basis—a new order of ideas, which, if not accepted at the beginning without some reserve, later on transforms the primary psychic personality by becoming an organized delirium. In other instances, individuals are certainly found with an order of false ideas not corresponding with reality, yet, notwithstanding, they live an intellectual life of a certain form of paradoxical monoideism, with groups of correlative ideas to which they conform their conduct—ideas which, arising primarily from an altered formative process of thought, gain possession of and then transform the field of the consciousness, persist there obstinately, become hypernourished, and hinder any other group of ideas from affirming itself. There is no contrast, no corrective to them. The monoideism is accentuated by the individual potential which overflows into the sensory zones by the same paths of communication and by the same selective tendency of thought to attain the sensory proof. In this case the potential is already augmented in the sensory spheres (hallucinatory latency). It is evident that the groups of ideas of high tension awaken, by consonance in the sensory zone, images that are in strict relation with them, and furnish the proof of the conception primarily formed. Two conditions are necessary: the increase of the intellectual potential—and one can admit that in any case where monoideism prevails in a mind not disorganized—and the increase of the potential in the sensory zones, which is determined by the intellectual and emotional potential.

The scheme shown in Fig. 6r gives an explanation of the above-mentioned facts, and harmonizes the various doctrines dealing with the genesis of hallucinations. The sensory zone *s* is shown in relation, on the one hand, with *s'*, which represents the peripheral expansions of the specific nerves or receptive organs, and on the other with *i*, which represents the field of intelligence. The potential in *s* may be increased by a prolonged, intense, and abnormal stimulus either in *s* or all along the course of the centripetal paths *s' s*, including intermediate stations (optic thalamus, corpora quadrigemina, etc.), or by increase of the potential in *i*, which overflows into *s* by the paths *i s*. It is always *s* that gives rise to the hallucinations with its own material, but through excitations that come to it from other parts.

As is apparent, the sensory centre must remain intact, so as to give rise to the hallucination, and in this matter I agree entirely with Tamburini and Joffroy. At the most, it may be the seat of an alteration compatible with its activity, which, as regards both the raw material that arrives there from the periphery and that which comes from the intellectual field, does not display itself more often in hallucinatory productions than in natures with a vesanic predisposition.

The visual hallucinations that sometimes occur in the field of hemiopia do not contradict this conclusion, because in such cases hemianopsia is produced by a subcortical lesion, the centre remaining intact, as in one of the preceding observations, or by a partial lesion of the cortical centre. In this connection the observations of Ferè, Bidon, Higier, Colman, Lamy, and some others are very instructive.

Such an induction is supported by the fact that abnormal stimulation of a single retina produces bilateral hallucinations.

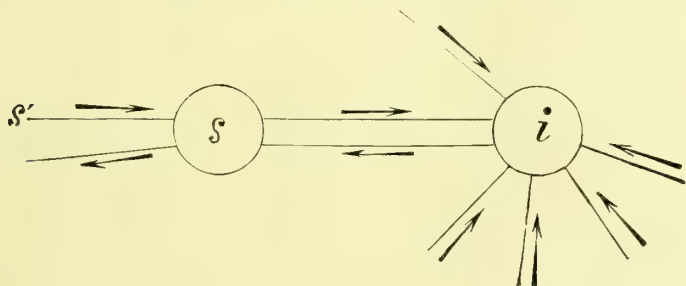


FIG. 61.

This need cause no surprise when we remember the perfect correspondence between the sensory centres of the two hemispheres (this explains the comparative rarity of unilateral hallucinations), and the results of the experimental researches of Fechner, Wundt, Helmholtz, Beclard, Ebbinghaus, and Titchener, who proved that excitation of one eye produces consecutive images in the other, which can only happen through the intervention of the cortical areas.

The other aspect under which the problem of hallucination is considered is that of the dynamism. The potential which increases in the sensory zone, which prepares and gives rise to the hallucinations, the instantaneous and forcible rising of these, the dominant influence they exert upon the consciousness (which has led James to say that hallucinations are a strictly sensational form of consciousness), should suggest to our minds an impediment to the discharge of the dynamic tensions in the nerve-elements of the sensory zones. When the sensory zones are in free communication with one another, the nerve-waves, no matter how and in whatever number they may

reach them from without, are continually transmitted and dispersed to other near or distant nerve-elements, and determine that constant change of psychic motion which is the most characteristic phenomenon of normal life. This happens when all the anatomical components of the cortex are in a condition to receive and transform, and in their turn to transmit, by their inherent virtue, the existing nerve-waves. The continual alternation of vibratory states and of states of repose of myriads of cell-groups, under infinite internal and external stimuli, is the condition of equilibrium in which we can sum up all the infinite attitudes of thought in the wide field of the mind. If the tensions produced by a high potential do not find the communications open, and are therefore unable to discharge themselves upon other nerve-elements and be transformed into other psychic products, they discharge themselves by those paths where they meet the least resistance, with all the characters of a sensory convulsion (epileptic) ; and the discharge is of such a nature that it produces, on the one hand, an exhaustion of the highest psychic powers, especially when these are not strongly organized, and on the other, a new orientation of the consciousness, surprised by the unusual phenomenon and conquered by the new invader. In strongly organized minds the hallucinatory surprise of the consciousness is soon corrected by the regulative powers, which resist the disintegrating and destructive violence of the hallucination. This occurs in the case of the periodic hallucinations of men who perhaps are fatigued but are of sound mental constitution. Even in these cases the ideative constriction is produced by a conscious or sub-conscious emotional state, which interrupts all, or almost all, the communications with the entire intellectual field, and exercises a coercive influence on the consciousness with regard to the hallucinatory emotional images, which, by their vividness and their intrinsic character, would strongly augment the potential in the respective sensory nervous components.

What takes place in individuals who are predisposed and of a vesanic constitution is quite different.

The vesanic constitution, so far as hallucinations are concerned, is characterized by :

1. The prompt closing of the paths of outlet of the nervous tensions, and the more or less complete isolation of the emotional consciousness.
2. The prompt increase of the sensory potential and the tendency towards stability of the same.
3. The prompt captivation and spoliation of the high regulative powers

In these psychopathic natures, the delirious idea flourishes in an emotional and favourable soil, and soon arouses the analogous hallucinations. It is quite different in cases of mental concentration, emotional or otherwise, occurring in sane persons confronted

by the most diverse difficulties of life, or in the investigator who sometimes assumes the characteristics of true scientific monoideism. In neither case do we get hallucinations. I have known some men to have been engaged for months at a thesis, to have concentrated all their mental energies upon it, to have given to it their whole activity, and to have spent very many hours upon it both day and night, abstaining from many ordinary interests and recreations, and yet no sensory disorder has shown itself in these cases. The explanation of this lies in the fact that, under ordinary circumstances, the emotional states of well-organized men are proportionate to the cause and not very persistent ; and the scientific theme of the true observer and thinker always disposes of a vast mental dominion, through which nerve tensions are discharged in the most diverse directions ; while the incentive of the hallucination is always of an inferior nature (sensory-emotional), and therefore less capable, notwithstanding the high potential, of assuming numerous relations in the constricted intellectual field.

The content and form of the hallucination sometimes possess a diagnostic significance. Auditory hallucinations are most frequently met with in paranoics, persecuted and persecutors ; the visual are most frequent in religious paranoics, in the subjects of hysteria, and in alcoholists ; the tactile are most common in acute forms of sensory delirium of toxic or infective origin ; the olfactory are most frequently found in onanists (paranoics and dement) and epileptics. In epilepsy they are more elementary, taking the form of flames, blood, noises, gunshots, in the midst of mournful scenes of carnage, and of threatening enemies and aggressors ; in hysteria they are most frequently of erotico-mystic content, and of animals. Sometimes they are also terrifying and stereotypic, but solitary, being repeated always in identical form in a vivid manner, or they are pseudo-hallucinations which sometimes determine cataleptic states and violent convulsions. It is impossible to enter further into details on this subject until we discuss the individual psychopathies in the third part of the work.

CHAPTER II

PHYSIO-PATHOLOGY OF ATTENTION

ATTENTION is a psychic fact interposed between perception, or its ideative equivalent, and the reaction which that tends to provoke. Attention, therefore, ranks amongst the highest reflex processes, such as conscious and voluntary movements and their inhibition. It is not the will, as some have believed, nor is it apperception. It contributes to the process of apperception, and to the direction of the will in the mechanism of conscious reaction. In general terms, it may be considered as a reflex process, because, to determine attention, there are required a stimulus, or its ideative equivalent, and the motor phenomena to which it gives rise even when it inhibits. It is a phenomenon occurring only in the conscious state, and is evolved and works in the field of consciousness.

I am unable to agree with those who, like Roux, hold that attention can exist outside the realm of consciousness, and like James Mill, that the process of attention is essentially passive, the active elements being simply an added fact—the will. As the essential moment in apperception, and as the author of the faculty of mental synthesis (Janet), it cannot be otherwise than conscious in its highest and most efficacious manifestations.

When an individual turns his sensory organs upon an object that has stimulated them, to gain a perception of that object, there is a sensory adaptation, voluntary or involuntary; but if there is perception, of whatever degree, he performs a conscious act. Attention is therefore a phenomenon in consciousness, and active, as Sully says, just as a conscious movement is active, and therefore we must recognise in it the most diverse gradations, from that which borders upon the reflex process to that which is the expression of the strongest will. Its purpose in general is to detain in consciousness the image of the object that has awakened the activity of the senses, an idea or a group of ideas, or an emotional state of mind with its relative ideas.

Thus attention appears to be the power of detention in consciousness (Sully, Ribot). This power is more or less strong accord-

ing as attention is voluntary or not, and this is a necessary consideration. A noise, a voice, music, contact, the presence of a person or a light, if they do not determine states of consciousness, will certainly not awaken a process of attention, such a process coming into action, with or without the consent of the subject, only if those stimuli determine states of consciousness. In such a case, according to the nature of the stimulus and the interest it excites, the image is detained in consciousness by the act of perception or apperception, and this gives rise to a particular motor adaptation, which will be described farther on.

Everything that is voluntarily detained in consciousness by the process of attention is sustained by a greater or less number of psychic components evoked and associated, and in this way the objective qualities of present things are always better distinguished and the groups of representations completed.

The object of attention is not solely to arrest a psychic fact in consciousness, a function which caused Sully to say, 'Attention is detention in consciousness'; sometimes it has for its object the removal from consciousness of groups of images or other psychic components out of harmony with the tone of the personality at any given time, and the substitution of others more in harmony with it. As a matter of fact, everyone has found himself at times unwilling to think of a certain matter, event, or product of his imagination, and anxious, as we say, to drive away certain thoughts. In these cases the elimination is effected by substitution, our attention being turned to other objects and calling up other memories, which occupy the field of consciousness in substitution of the first. While we do not admit that attention may exist outside of consciousness, we must not fail to divide it into voluntary and involuntary attention, and we must reject as very improbable the idea expressed by Hamilton that attention is nothing more than a fact of consciousness.

'Attention,' he says, 'is consciousness and something more: it is consciousness concentrated' on some determined object. It is like the point of convergence of two forces acting in opposite direction. One of these is the intrinsic property of the action of external agents on the nervous element, and of the adaptation of this element to their demands, its direction being from without to within; the other emanates from the power of the ideas or the emotions that pass through the field of consciousness independent of any actual agent, and most frequently arises from the unconscious. This second form of attention is in great measure produced by education, and it has its maximum value in the process of apperception.

If the matter be well considered it will be seen that these enunciations go beyond the truth. Attention shows a gradual evolution. From automatism—which, however, upon lies the threshold of con-

sciousness—there is a gradual advance to the highest confirmation of the concentrative and extensive power of the mind. This is often the product of education.

The first object that education proposes to itself is the formation of a habit of work, and voluntary attention is work. Everyone feels the effort that profound and prolonged reflection costs. Our willingness to give attention has caused Bastian to say, and not without reason, that ‘all the processes of voluntary attention are complex phenomena composed of volition and attention.’ Education, during the period of mental development in the young, tends precisely to substitute voluntary for involuntary or sensory attention by all the means so well known in the art of teaching. The exercise of the will in the process of attention creates both the habit of reflection and a reflective attitude of mind, and so diminishes the effort required.

Education must furnish compensations for the labour of attention, which is an effort, and breaks the general law of habit—indistinguishable from the law of least resistance. It is through attention that ideas, existing but lost in the deep sea of oblivion, are most promptly recalled to consciousness, and also by its means that new ideas are created by the enlargement of our network of associations in the process of apperception. The enlargement of our range of associations by pausing upon the object of attention, or by an adequate distribution of attention—thus facilitating the knowledge of the greatest number of objects in a minimum of time—is the great secret of all progress, which consists at bottom in the perfecting of our notion of things, and of our cosmic and historico-social environment. Many men of genius owe the vigour of their conceptions to the penetration and constancy of their power of reflection, and to the due distribution of that power.

Voluntary attention has, further, the power to excite and to regulate in consciousness the movements of the psychic components of the personality, either under the influence of external stimuli or under that of a more or less complex mental derivative. The effect of this is to increase the intensity of a representation and to render it clearer by isolating it from other representations that do not contribute any increase to its intensity (N. Lange).

Involuntary attention is the coercion exercised upon the personality by external stimuli through the sensory organs respectively excited. Between this and voluntary attention there is a chain of psychic facts that range from instinct to habit, to conation, to effort (De Sanctis), inasmuch as instinct and habit have an element of consciousness and of voluntary conation.

One of the most notable effects of the force of reflection is the augmentation of feeble stimuli to varying degrees of potentiality. This augmentation is easily understood when we remember the accommodation of the consciousness and the preparation of the

imaginative centres for the reception of the new guest, whose importance varies according to the number of its relations, in consciousness, with former psychic components of the personality ready to come into touch with it.

This phenomenon has been recognised and denoted by the word 'preperception.' It had already been well defined by Helmholtz and Wundt as the preparation of the perceptive field for feeble stimuli, and in my opinion Ribot and Lange are wrong in judging it to be subsequent to the muscular adjustment.

This convocation in consciousness, or on its threshold, of a richer mental content ready to assume associative relations with the new percept, while it facilitates perception, is the foundation of the imagination on the one hand, and of sensory errors—illusions—on the other. How often have we experienced the fleeting illusion of believing persons, things, and circumstances to be present just because our minds were at the moment filled with those determined ideas, coloured by the emotions of fear, eager desire, suspicion, etc., that give their stamp to the new percept? Here we have the concurrence of all the mental residua organized in the unconscious and giving each individual his particular tone, inasmuch as the cumulative effect of the past projects itself into consciousness, fixing there a series of predominating interests.

Certainly the original disposition and the receptivity of the personality must have a very great influence on the reflective power, since both sensory and voluntary attention are nourished and reinvigorated by interest in things, and by the two fundamental emotions, pleasure and pain, under the action of various external agents and their psychic derivatives.

Maudsley, Carpenter, Horwicz, Ribot, and others, have already pointed out the emotive and affective origins of attention. The two fundamental feelings have a notable effect in raising the tone of the attention, which returns by preference to the objects of pleasurable sensation, accumulated by experience and fixed in the respective cerebral reticula. As pleasure presents infinite gradations, from the lowest and purely instinctive to the highest—such as intellectual, moral, and æsthetic pleasures—we can figure to ourselves attention as represented by so many concentric curves showing the gradations of pleasurable feelings, involving acts of voluntary selection to fix in consciousness the objects harmonizing with those feelings, and by another system of curves, opposed to the first, representing gradations of painful feelings, with regard to which the selective power is devoted, under the direction of attention, to the removal from consciousness of all that influences the personality in a painful way and in opposition to the fundamental laws of its existence. Bearing this in mind, it becomes clear that in the power of attention we shall find one index of the will-power of the person.

From the fact that attention cannot be brought into play unless by peculiar muscular accommodation, there has arisen the doctrine, supported by many physiologists and psychologists, that attention is a motor phenomenon. No one has any difficulty in recognising the general attitude assumed by an observant individual.

The gradual arrest of bodily movements (especially of locomotion) in proportion to the intensity of the attention, the contraction of the brow and the superciliary region, the peculiar immobility of the facial muscles, the fixity of the regard, and the dilatation of the pupils, are the expression of so many muscular movements. As Fechner, Lewes, and Bain were among the first to observe, some of these are intrinsic to each idea, and give particular muscular representations proper to the motor adjustment both in sensory and in intellectual attention, causing some to consider the latter form to be less intense and noticeable than the former. Others among these muscular actions correspond to the movements of adaptation and of arrest. But if the motor accommodation be the confirmation of a general law, derived in part from the presence of the motor component of each sensation, and therefore of each idea, leading in the process of attention to a motor manifestation, which itself is equivalent to the sum of the motor components of all the ideas that attention brings together and synthetizes, their energy being resolved into a resultant that brings the greater part of the muscles of the body into a state of arrested motion, that is very far from giving the phenomenon the significance of the intimate motor nature of the activity displayed in attention. The most that we can say is that, in a function so complex as attention, the motor factor is but one of the components, and not the whole function; nor does it explain the process, still less the effect of it. In fact, if we fix our attention upon an object or an idea, we can clearly distinguish the phenomenon of the conation, or the evocation and concentration in consciousness of a greater or less number of psychic components, from the sensation that arises from the peculiar muscular activity, which is often nothing more than the effect of the inhibition caused by the extraordinary intellectual concentration in the field of consciousness. Other muscular sensations are more intrinsically connected with the nature of the images evoked, for example, when we think, and at the same time speak, internally, as we say, this internal speech associates itself more or less in various men with a rudimentary articulation of the words; again, when we recall ideas of form, say the circle, the sensation of the motor adjustment perhaps predominates. If, however, we evoke and visualize images of colour, the motor component of attention is reduced to a very small matter, generally only to what forms part of the word corresponding to the image evoked and to the special relations of the latter. It is certain that we can exercise a very strong power of attention when in a horizontal position, lying

on the side or the back. How often does it happen that we awake in the night, especially when we have gone to sleep with the mind preoccupied, and reflect intensely on the subject of our preoccupation with all our mental resources? Though in these cases we cannot deny that there is a change in the muscular tone, yet it must be agreed that the muscular action is reduced to an almost imperceptible minimum. Certainly there is no proportion between the reflective activity and the work of the muscles.

Those who maintain the muscular nature of attention adduce in support of their hypothesis the pain in the occiput suffered by those who reflect long and intensely. This pain in the occiput and the muscular sensations characteristic of ideative attention are not due to weariness of the organs of the senses, but have their seat in the soft parts of the head. Fechner believes that these depend on the contraction of the muscles of the skin of the occiput, and Münsterberg that they are concomitants of the fixation of the head due to the muscular adjustment of attention.

If we recognise, then, with almost all the psychologists and physiologists, that the sensations of motor adaptation enter as components into the complex fact of attention, everyone may convince himself, by the method of introspection, which Sully appears to have preferred, that the essence of the psychic fact of the conscious concentration of intellectual and emotional components cannot be confused with the motor phenomena that accompany it. In other words, attention cannot be conceived as a motor function. It is within the power of all to convince themselves that attentive visual observation of an object is possible without moving the eyes, as when we fix our look on one point of the field of vision and observe some object towards the periphery of that field. I cannot persuade myself that the fixation of the body, of its parts, of the organs of sense (the eyes), at the point of equilibrium, as it were, of all the antagonistic muscular forces, dependent in its turn on the inhibition of diffuse movements, is the substantial fact of attention, when I think that a man who is utterly paralyzed can direct his thoughts at will.

I have had under my care a learned professor of literature and theology, of the Order of Propagandists, who, after a panegyric, had a serious attack of polyneuritis that spared only the muscles innervated by the cranial nerves. He showed the most complete muscular resolution, and there was no faradic reaction. In this state, for many months, that man was able to direct his will perfectly to all the verbal manifestations of his thought. He had lost none of his strong power of attention.

From these observations it is more than permissible to infer that the motor fact is the visible phenomenon by which attention is recognised, and it has two sources: on the one hand, it is the movement of the organs of sense, of the head and the trunk, towards

the actual stimulus—the reflex or instinctive attention of N. Lange ; on the other hand, it is the increased spinal innervation (tone) of the muscles, due to the concentration of the cerebral energy on the object of attention (inhibition).

We must not, however, neglect the motor component that is an integral part of every image, for it is of no less importance than the state of inhibition in which the whole muscular system is placed in consequence of the conscious concentration of ideas. The one form of movement is specific and individualized for each idea ; the other is general and uniform, whatever be the nature of the ideas convoked and concentrated by attention.

Some psychologists and physiologists have put forward the question of the cerebral seat of attention. Among them two of the most strenuous supporters of a seat of attention are Ferrier and Wundt.

As I have mentioned in the first part of this work, Ferrier localizes the ‘faculty of attention’ in the frontal lobes. His hypothesis is logical. When once he concludes that ‘the faculty of attention, with all that it implies in the sphere of the intellectual operations, must be intimately related to the volitional control (muscular) of the head and the eyes, in association with the centres of visual perception and ideation,’ and since the motor centres of the head and the eyes are localized in the frontal lobes, attention becomes essentially a motor function, in his view, and its seat must be that of the movements of the head and the eyes. I reproduce his actual words, referring to the behaviour of apes deprived of their frontal lobes : ‘It is a form of mental degradation that seems to me to depend upon the loss of the faculty of attention, and my hypothesis is that the power of attention is wholly connected with the voluntary movements of the head and the eyes.’

I had to criticise that hypothesis many years ago (‘On Functions of Frontal Lobes’ *Brain*, 1895), and in the first part of this work the reader will find what is, in my opinion, the function of the frontal lobe.

Wundt also localizes apperception—which, according to him, is attention—in the frontal lobe. It will be useful to give here his idea in full : When an external object awakens attention, the first effect is the formation of an image of the intuitive order, but not definite. The sensory irritation is at the same time transmitted to the central territory of the apperception. Then the stimulus follows a twofold direction—towards the sensory territory, with the effect of strengthening the image, and towards the motor centres that innervate the voluntary muscles, whence we have that muscular tension which causes the feeling of effort that accompanies attention, and in its turn reacts upon the attention so as to strengthen it.

As I have set forth the complex function of the frontal lobe in the first part of this work, I merely state now my conviction, in which I am at one with Bastian and others, that the frontal lobe is the organ of attention, in so far as it is the one on which we bring together the whole intellectual and emotional patrimony of the personality, and in so far as it is the centre for summoning up separate images, of which the equivalents or duplicates are sent from the sensory zones to the frontal lobes for physiological fusion with others and for the formation of mental products of a more elevated order.

The attitude of readiness, of expectant attention (anticipated attention), shortens very much the time of reaction—the time that elapses from the moment of the impression to the moment of the reaction, which denotes that there is perception—until the interval completely disappears. To give an example, this interval falls from $\frac{2.50}{1000}$ to $\frac{.80}{1000}$ of a second, and sometimes disappears; but distractions increase the interval enormously.

With these methods we shall be able to find a mode of obtaining the measure of attention, or, in other words, the reflective equation. The methods introduced in the researches of Wundt and followed with greater or less modification by Tschisch, Obersteiner, Münsterberg, Bartels, Lange, Baldwin, Janet, and others, and in Italy especially by Buccola and Patrizi, have given only modest results. James Swift's methods deserve more attention ('Disturbance of the Attention during Simple Mental Attention,' *Journ. of Psychol.*, 1892). Experimenting under exactly similar conditions, Swift succeeded in proving that in 100 cases, while the time of simple reaction was 0.103 seconds, it was increased to 0.122 seconds when the attention was disturbed by a metronome beating 120 to the minute. In other series of experiments the range was from 0.110 for simple reaction to 0.158 for reaction with disturbed attention.

As we have seen in Chapter I., the time of simple reaction is much shorter than the time of reaction where there is a choice. In the choice the attention plays an important part, but the interval is very much extended when the attention is disturbed. As a matter of fact, the time of reaction with choice, which was 0.179 in Swift's experiments, was increased to 0.197 by the mere intervention of the sound of the metronome, and when the attention had turned to the cause of the disturbance it mounted to 0.265. The same results, except for difference in the figures, were given by experiments in which the distracting stimuli were lights, or were of a more complex nature, such as the repetition of a piece of poetry learned by heart, reading, etc.

Birch ('A Study of Certain Methods of Distracting the Attention,' *Amer. Journ. of Psychol.*, 1897-1898) has adopted a method, which, if it has not given any new results and sure conclusions, promises many positive facts for the physiopathology of attention.

He used a number of odours to distract the attention, and he distributes the results he got into four series :

1. Distraction caused by familiar odours that could not be named.

2. Distractions due to odours that were very familiar through the recollections they awakened ; in this case attention turns upon the recollections.

3. Distraction due to unfamiliar or nauseous odours.

4. Distraction due to easily recognisable odours, the recognition of which, however, suggests ideas extraneous to the experiment.

All stimuli, however, do not possess equal power of distraction. From the interesting observations of Darlington and Talbot (*Amer. Journ. of Psychol.*, 1897-1898) we have the general result that music facilitates the attention in place of inhibiting it.

The stimulus chosen to distract sometimes reinforces or facilitates attention. In general, the stimuli that cause the greatest distraction are emotional ; those appealing more directly to the intellect, while they demand more active attention, are less distracting.

I have said 'modest results,' because we may agree with Buccola that the time of reaction, taken as the measure of attention, is like the dynamometer in the measurement of force, and with De Sanctis and Janet, that the method does not merit that importance that others have ascribed to it.

However this may be, the method of distraction, by which the time of reaction is notably modified, may give important results for normal and pathological psychology and for pedagogy. In a process of attention, according to De Sanctis, we must consider not only the power of accommodation or of fixation, but also that of distribution or the extension of the field of attention. In measuring this field we may take into account the aptitude to distribute attention simultaneously over several objects, with frequent, strong, and multiple acts of volition, and the greater extension of the field represents the pinnacle of evolution of the attention, 'provided that in distribution it maintains at a high level its index of will-power, and reaches the cognitive effect corresponding to every object to which it is directed' (De Sanctis).

Janet, employing the concept of the extension of attention, has succeeded in demonstrating that there exists a relation between the power of attention and the extent of the visual field. This relation would explain the idea of the extension of attention. In fact, while the concentration of attention on written words or figures restricts the field of vision in sane subjects by not more than 5 or 10 per cent., the same condition produces, in some morbid states, a considerable restriction, sometimes allowing nothing more to be seen than the single word or the single cypher or drawing in the centre of the perimeter (Janet, *Nevroses et Idées fixes*, 1898).

Independently of the causes of distraction there exist physiological fluctuations of attention in the case of stimuli of minimum intensity. Lately these have been thoroughly studied by Cook (*Amer. Journ. of Psychol.*, 1899-1900), whose results contradict those of Heinrich. If at night we have a small watch near the bed, we do not notice its 'tick-tack' continuously; it seems to disappear and reappear, all the other conditions remaining the same. Urban-tschitsch explains these oscillations by the weariness of the external sensory organ, differing from Lange, who attributes to them a central origin. Münsterberg makes them dependent on the muscles of accommodation; H. Eckener (*'Untersuchungen über die Schwankungen der Auffassung minimaler Sinnesreizen,' Année Psych.*, 1889) attributes them in part to the weariness of the sensory organ, in part to the persistence of the representations of the noise.

A new factor for the interpretation of this phenomenon has been introduced by A. Lehmann, who has discovered a relation between the oscillations of the attention and the phases of the respiration and the bodily adjustment. As is well known, attention induces a notable change in the graphic representation of the respiration: thus, oscillations of attention, due to stimuli of hearing, sight, touch, are more frequent during the pause in respiration, when the blood-pressure in the brain is at its minimum, and at the end of the inspiration, when the pressure is at its maximum. That signifies that these two phases of respiration are less favourable for the production of weak sensations. On the other hand, the respiration, the circulation and the pressure of the blood undergo notable changes during a state of attention. A mental calculation, even though it last only a few seconds, produces an almost constant acceleration of the heart-beats, and increases the pressure of the blood (Gley, Binet and Courtier, MacDougal). The power of attention develops with advancing years. In infancy this power is sensory, and rises by degrees to the strongest will-power in the adult man, as his mental equipment increases and is disciplined in consciousness. It decays in old age, and is weakened by all the involuntary and degenerative processes of the nervous centres.

The pathology of the attention might be enriched by a very large number of pathological facts, which would render this study very interesting were I not obliged to limit myself to the most important and most frequently recurring. In the times in which we live, when neurasthenic conditions have become so prevalent—and, above all, from the methods followed in our secondary schools, the effects of which are felt also in the higher schools, where the organization is such as to cause great hurt to mental vigour, on the very eve of the day when man tries his strength in the struggle for life, a struggle in which the youth at once engages when his studies are over—the fault most frequently noted is the incapacity to keep the voluntary attention active for the time required for the regular

employment of one's own activity. The most general complaint of these men is of incapability to follow the thought of the professor for something less than an hour without having their attention distracted, or to maintain a determined order of ideas in consciousness for a desirable length of time. It may be that their reading resolves itself into a useless waste of time, because whilst they read their consciousness is filled with many other extraneous ideas, the invading power of which grows in proportion to the diminution of the power of attention, which ought to force them to the perception of the thought contained in what they read. Thus, after reading for a longer or shorter time, they do not know what the author means to say, and are obliged to begin again at the beginning, most frequently with no better result.

As we see, we are here dealing with diminished power of detention in consciousness, and also with diminished regulative and selective power. This latter fails because everything that invades the mind, without volition of the subject, and often, indeed, against his will, is not repulsed. It breaks freely into the field of consciousness, taking away more or less perceptive power, and especially apperceptive power. We have here two facts which are associated and are characteristic of this pathological state : on the one hand, the incapacity to hold in consciousness the ideative constellation that is the object of voluntary attention ; on the other hand, the incapacity to keep outside of consciousness a number of other ideas that have no relation to the preceding, and against which the will-power of attention is exercised weakly and inefficiently.

Fatigue, to whatever cause due, produces this phenomenon, to which has been given the name of '*hypoprosessis*'—diminution of attention—and which all of us have experienced, not excluding men of habitually strong reflective power. Sometimes the attention maintains its strength on the concentrative side, and diminishes on the distributive. These are the cases of so-called distraction, of which we can recognise two types,—'concentration in the void' and 'concentration on a single idea.' Cases in the last-named class are strongly attracted to one theme or one thought, are, as we usually say, absorbed, and cannot bring their attention to bear on any other subject. This phenomenon is often observed in great men.

A strong diminution of the power of attention, rather on the distributive than the fixative side, is produced by the emotions. The observations of Ferè, of Binet, of Pick, of Mosso, and others, are within reach of all. Fear, rage, hatred, love, jealousy, immensely restrict the field of distributive attention, and considerably diminish that of concentrative attention. A healthy and regularly evolved man can, in ordinary circumstances, recall to mind that part of his mental experience that pleases him most, conformably to the varied and mutable aims in life. In our consciousness, ideas are con-

tinually following upon one another and are as continually being renewed, and so it is with emotions and impulses, some of which we will, others not. Some of these invade the field of consciousness by their own strength and subjugate the will; others come into consciousness because we have willed to call them up (voluntary attention). Thus the struggle against the selective power of consciousness is revived or is suspended, giving rise to voluntary renewal or forcible invasion of ideas, and our adaptation to those that obtain the consent of the will, even though not voluntarily evoked, thanks to their vibrating in harmony with the personality at that given time. All forms of nervous weakness, congenital or acquired, are accompanied by more or less accentuated hypoprosessis.

There are other morbid states in which the selective capacity is immensely reduced and the will is powerless against the more or less importunate guests of the consciousness; here, attention is impotent against the intrinsic power of the unconsciousness, which, despite the protest of the will, furnishes useless food to the consciousness; in vain does the will invoke the aid of attention; for the latter has, in fact, become the slave of that mental content which the will seeks to drive out of the invaded field of consciousness. Granted that the power of attention is in inverse ratio to the psychic automatism, then in this case the physiological formula would be inverted, owing to the excessive power of automatism and the detention of attention in consciousness, in opposition to the will. Cases of so-called fixed ideas, of baseless fears (phobias), of irresistible impulses with their resultant acts, and of irrational emotions, offer rich material for the observation of this inverted law—inverted at the cost of voluntary attention.

Some consider that there is *hyperprosessis* in the malady of fixed ideas. Certainly we have here neither voluntary concentrative hyperprosessis, because in these cases the power of convoking images in consciousness, of selecting and eliminating them, is defective; nor distributive hyperprosessis, for this is almost abolished. On full consideration we shall find here automatic sensory hyperprosessis, therefore we may speak of hypoprosessis, and so avoid falling into an erroneous interpretation of the facts. The predominance of automatism is revealed also by other facts related to those previously examined and referring to actions. The most common case is of those errors that go under the name of *lapsus calami*, which occur oftenest to persons who are fatigued, and sometimes with such frequency as to cause anxiety. Words are written other than those which it is desired to write, the wrong word generally having some reference to an idea that intrudes upon the consciousness of the writer, and manages to resolve itself into the corresponding graphic movement, evading the directing power of the attention. At other times, the mind of the writer

passes from one word to another more rapidly than the hand, and while the elementary movements required for the formation of letters, syllables, and words are left to graphic automatism, attention directs their succession. If the attention fail for a moment, then automatism takes the upper hand and completes a word by a syllable or a vowel belonging to the next word, omitting altogether the proper ending of the first.

Sometimes these errors happen in very small numbers to perfectly normal individuals, by reason of the already mentioned physiological fact of oscillations in the intensity of attention ; or, as others put it, fluctuations of attention to elementary sensations.

All neurasthenic conditions give numerous examples of such defects of attention.

We have already noted that attention exercises a selective power upon the myriads of impressions forming matter for percepts, so that the mind is enabled through attention to prepare itself to receive from among the number only those that have special interest for it. This selective power diminishes until it gradually disappears, in all conditions of original mental debility—weak-mindedness, infantilism, imbecility, idiocy—or in cases of primary, secondary, or paralytic dementia.

The most conspicuous examples are furnished by the first class—that is, by cases of defective and incomplete psycho-organic evolution. In such cases the sensory or involuntary attention is awakened by the objects that fall under the senses, but no choice is effected ; hence those sensory reflex movements by which sufferers under this category are kept in continual motion towards the objects themselves. Here we have reflex sensory processes of no use for the increment of the personality ; also more or less complete absence of voluntary attention, and therefore of apperceptive power.

The same defect, more or less accentuated, is met with in all forms of mental confusion and of dementia, as well as in all conditions of maniacal exaltation and in hallucinatory forms of insanity. It is needless to add that in these different cases attention is faulty on different sides of its mechanism. In mental confusion the attention is defective owing to the dissociation of ideas, so that in consciousness there are no true constellations, but only a fragmentary residue of these, and detached images without any bonds of association ; and upon these the power of reflection exercises itself in vain. In maniacal exaltation the pleasurable emotion confers on the ideas, and on the content of consciousness in general, an extreme mobility that is intolerant of detention, while there is a continual discharge to the motor system (psycho-motor excitation). In hallucinations the attention is occasionally concentrated, and may be fixed for a long time upon the hallucination, so that the individual appears to be withdrawn from the influence of external

stimuli, thus presenting the appearance of a state of distraction or of incapacity of sensory or voluntary attention, while such an attitude corresponds perfectly to the law of intensity of stimulus. In these cases we may speak of true concentrative hyperprosessis for hallucinations, and of hypoprosessis for real objects.

In this and other classes there are cases in which the attention may be awakened, in which we recognise, moreover, a power of attending to objects and a directive and selective power over ideas ; but such attention is soon exhausted, and after a few propositions, the automatism of the images assumes the upper hand.

There is always a notable defect of attention in that form of psychic degeneration characterized by impulsiveness (congenital delinquency, epilepsy).

Besides defects of attention, there exist morbid states of hyperattention (hyperprosessis). This phenomenon is most frequently met with in paranoia, in hypochondria, sometimes even in melancholia, and in the first phase of hypnotism. In paranoia, sensory disorders are most frequently the effect of hyperattention and of preperception.

When the paranoic idea—the fixed idea—commences its work of transforming the personality, assuming relations and bearing with it into the field of consciousness all other ideas that are somehow or other associated with it, the perceptive territory is prepared for weak external stimuli, which are sought out by the paranoic subject in order to correlate the new psychic content of his consciousness with the external world.

This period of the malady is characterized by expectant attention, which sometimes gives rise to preperception and illusion, favoured by the transforming power that the new consciousness has over the percepts. In this illusory transformation of the percepts in consciousness we have one of the most important attributes of paranoia, a trouble which keeps the attention ever vigilant and intently seeking in the external world the objective proof of the new facts that interest the personality thus menaced.

So it is also in hypochondria. Slight organic sensations, that pass unnoticed in normal states, traverse the prism of preperception, and fall among the material prepared by hyperattention, furnishing matter for false judgments as to the threatened health. As may be clearly seen, we have here at work not only hyperattention, operating freely on external and internal objects as they alternate, but also a forced unilateral attention, bound to the dominating ideas of the new personality, and prepared in the unconscious for the beginning of a new life—a life with false relations to the external world, and directed towards a theme from which attention has no longer any power to detach itself.

Exalted power of attention is also met with in states of passion. In melancholia and in the first phase of hypnotism we may find examples of concentrative hyperattention. According to the observations of all those who have investigated this subject (Haidenhain, Beard, Schneider, Richet, Morselli, Janet, and many others), there coincides with the fixation of the look, in the first period, a hypnotic suggestive monoidism.

Concentrative hyperprossesis can also be recognised in ecstasy, and has its counterpart in the great attention that infants, savages, and even apes pay to bright and shining objects, seen for the first time.

CHAPTER III

PHYSIO-PATHOLOGY OF MEMORY

CLOSELY connected with the subject of perception and with its qualitative and quantitative disorders is that of the memory and its disturbances. This is not the place, however, for a long and methodical exposition of the doctrines of the psycho-physiology of memory. I shall mention only in what memory consists, what constitutes its mechanism, and where it is situated, and give a few general laws that govern this, the most important and substantial function of the brain, pointing out likewise the semeiological value of the defects and disorders of memory as independent factors, and also as related to the various forms of mental maladies.

I have already said that no stimulus which acts upon the nervous system fails to leave behind a trace of itself, or to modify the system in some part and in some way ; and now I mention that the same modification is reproduced, as a whole or in part only, under the same stimulus or under analogous stimuli. This is the general law. I go beyond what has been affirmed by Herbart and his school, according to whom perceptions persist in the mind and only apparently disappear. Memory is not only of percepts, but also of nervous modifications of which we have no perception. Whether the stimulus succeeds in determining a state of consciousness or merely rests outside the threshold of consciousness, that part of the nervous system that has been subjected to the action of the stimulus has been modified in such a way that, under certain conditions, this same modification is reproduced.

The ideas of Sergi as to the influence of the repetition of the stimulus can mean nothing else than this, for he thinks that the external excitations are not at first adapted to give a definite sensation, and that the sensation arises through a sort of adaptation to the excitations—that is to say, the first excitations of the series have sensibly and successfully modified the part of the nervous system that they have traversed, so as to facilitate the passage of the successive stimuli, which, owing to the diminished resistance,

will succeed in reaching and forcing the portals of consciousness, though their intensity be no greater than that of their predecessors.

According to Adamkiewicz also, memory has no psychic character in itself. He advances the hypothesis that the mnesic phenomenon resembles the energy by means of which a solution of caustic soda absorbs carbonic acid (myelopexia).

Memory is therefore defined as *that function by which the nervous system receives, conserves, and reproduces impressions*. The conditions under which memory may exist are those known to biology : regular irrigation by the blood, and normal rechange of material, securing the efficient nutrition of the brain, which is the organic condition indispensable to *receptivity*, to *retentiveness*, and to *reproduction*.

It is necessary to go more fully into the question of the constitution of these various elements of memory. We have to learn more particularly by what mechanism reception, conservation, and reproduction of the nervous processes are effected ; how to interpret the phenomenon of recognition, which is one of the moments of perception ; what is the mechanism of conservation and of reproduction, and what is the anatomical basis of memory. This subject demands our attention the more urgently as the memory is a fundamental property of the nervous substance, without which no other phenomena of the mind would be possible, not even perception itself, which is based upon recognition. C. Richet wrote well to the purpose in 1886, when he said : ‘ Of all the psychic functions memory is the most important. Without memory there is nothing in the intelligence, neither imagination nor judgment, language, nor consciousness. It may be said of the memory that it is the keystone of the intellectual structure.’

We commence by examining in more detail the phenomena of reception and of conservation, with which is closely connected that of reproduction. In what do these consist ? The hypotheses are more or less probable, but they cannot be subjected to any manner of experimental control. We have to deal with a movement, or with a chemical modification, or with both together, as in any other physiological fact. This may be admitted through analogy.

Except Luys—who maintains the doctrine of movement, which admits a vibration of the nervous element under the influence of external stimuli, the nervous element being brought, as it were, into a state of transitory catalepsy—all the authorities agree on the hypothesis of a molecular or atomic movement in the cell, which is difficult to conceive of, apart from a chemical modification. Matters have not advanced beyond the point reached by Maudsley, according to whom the same nervous current is reproduced when the same idea is reawakened. A material and atomic modification, from which is inferred a persistent modification of the nervous element, is admitted by Hering and by Delboeuf, who say that the

residuum of the external action consists in a new disposition of the molecules of the nerve-cell; also by Biewliet, who thinks that both simple and complex images formed under the action of stimuli are conditioned to a movement that alters the molecular structure of the nerve-cell for a varying period of time. The molecular structure assumes a new arrangement, facilitating the repetition of the movement, and in its turn this induces a more considerable deformation of the cell itself, thus insuring a more facile reproduction of the images.

The movement that has taken place leaves a trace of its passage—the *disposition trace*. Neither the *pure* psychologists like Bain Ribot, Sergi, nor the physiologists like C. Richet, dissociate themselves from the concept of cell modification. Even Wundt, who will not admit either the doctrine of Herbart or that of Delboeuf and Biewliet, recognising only the disposition to reproduce images, is forced in the end to allow that if anything is reproduced it must have remained over, in some form or other, from a *quid* that has modified the nervous system in a permanent fashion in some particular part. It is useless to devote longer time to a subject that is decidedly hypothetical, and about which everyone may be repeating the same thought in different form.

Receptivity.—By this word is understood the complete action of receiving and conserving. About receiving we have said all that is necessary in the chapter on perception. As to conservation, we shall say here what is required for the comprehension of those phenomena that will most directly occupy our attention. In order that the physiological fact of conservation may be realized, it is necessary in the first place that the anatomical substratum of perception should maintain its condition, and also that there should be a normal state of all those factors that concur in maintaining the integrity of the anatomical substratum (nutrition, circulation, etc.).

On the other hand, conservation is ruled by many of the laws of perception, which it is needless to repeat here. The time required for perception and discernment is also necessary for conservation; and it is natural that if the stimulus prolongs its action on the centre of perception, other things being equal, the conservation of the images formed, and of their derivatives, will be more certain.

The intensity of the impression is equally a condition of the conservation of the images, which is bound up with the fact of perception. We might formulate the law that a percept or a secondary product due to association will be all the more surely conserved the more perfect the perception.

The muscular component of perception and attention, and therefore the muscular memory, have a great influence on memory in general. This affirmation, that might be sustained on *a priori*

grounds, for the very evident reason that the more extensive the associations the more enduring is the memory, has been subjected to experimental proof by L. Smith. It will be well to recall some of his experiments. He made certain individuals repeat a series of ten syllables after they had read them mentally for a fixed time—twenty seconds. This reading to one's self, as is well known, induces rudimentary movements towards pronunciation. On alternate days he made the same individuals pronounce the numbers 1, 2, 3, etc., while they were reading to themselves, on purpose to hinder the nascent articulatory movements during the reading. The syllables were repeated after seventy seconds. Of course, the number of mental readings varied according to the individuals during the twenty seconds. In the series of simple memorizations (mental reading) the number of errors over all the subjects experimented upon was less than in the case in which the subjects counted while they were committing to memory. In the latter instance there was an increase of error of 12 to 17 per cent.

These experiments prove what a great influence on memorization is exerted by the motor images associated, for example, with the visual images. When we read to ourselves, or when we read aloud, the motor images are associated with the visual, in the first case as nascent movement, in the second as effective movement. If the visual image be isolated by suppressing the muscular image with the aid of suitable experimental methods, as was done by L. Smith ('On Muscular Memory,' *Amer. Jour. of Psych.*, 1896), the number of errors in the memorization is increased by 10 to 22 per cent.; but these errors prove the influence of distraction, and therefore of attention, upon the memory more than they prove the influence of the muscular sense on the memorization; and Smith therefore made some subjects learn a series of ten designs, such as are used for teaching the alphabet to deaf mutes. In some of his experiments (the visual series) he exposed the series of ten to view for a fixed time; in others, besides the sight, he made the subjects pass their fingers over the drawing, using natural movements (the optic motor series). In the last experiments the errors were 10 to 22 per cent. less in number than in the visual series.

For the same reason, the repetition of the stimulus, in the opinion of some, secures the conservation of its psychic products. The repetition takes place in two ways: either the object that has made the impression is represented at different times, or we voluntarily reproduce in our minds a certain image, in order the better to conserve it. Towards securing this result, voluntary attention and the grade of participation of the *ego* in the objects perceived make large contributions. The more the *ego* is interested in the object of perception, or, what is the same thing, the higher the intellectual-emotive potential that accompanies a perception or its derivatives, so much more certain, other things being equal, is

the conservation of the percepts, of the secondary composites, and of the acts to which they have given rise. It is the interest awakened by a certain external or internal attitude that attracts the voluntary attention, which, as I have said before, concurs in the conservation.

Repetition of the perception of an object or of a person does not always contribute to furnish clear concrete images in corresponding numbers. Taine has already noted the fact and given a plausible explanation of it (*Intelligence, trois. édition, 1878*): 'The repetition and the variety of our experiences,' he wrote, 'tend to render the images less precise. If we see a person eight or ten times, the outline of his form and the expression of his face are in the end less clear in our minds than on the morning after the first view. The same thing happens with a monument, a street, or a landscape that we see several times at different hours of the day. The first impression, clear enough, becomes less exact the second time. When the image of the object perceived tends to come up again, it brings with it all the others with which it is associated, and as these have varied at different times, they cannot all arise again together. Now, if these concomitant images be excluded, still they have a tendency to arise again, and even if they do not secure representation, yet, remaining in a nascent state, they will form what is called in ordinary language an impression, which may be strong without ceasing to be vague.' Philippe has confirmed this idea of Taine by experiment (*Revue Philosoph., 1897*). He agrees with the concept that the images of an object are less precise in proportion to the magnitude of the sum of anterior representations from which they result; also the rarer the images or percepts, the more concrete they are. On the other hand, if the perceptions have been numerous, the images lose their precise and individual characters and become general.

These researches also tend likewise to bring into evidence the relation between perception and memory.

A well-developed perception is bound up with the past experience of the individual. It is true, however, that not all perceptions involve a mnemonic image, nor is a mnemonic image required for recognition, as there may be reference solely to a quality of knowledge or to the simple sentiment of recognition (Bourdon and Washburn).

Sometimes the stimulus, such as a simple perception, is new to the organism, and so does not require a mnemonic image, but resolves itself into an emotion rather than a cognition.

The sensory provinces of the cerebral mantle do not possess equal powers of conservation. As a rule, the visual memory is stronger than the aural memory. Experiments made upon 379 pupils by A. Kirkpatrick (*Psych. Rev., 1894*) demonstrate the superiority of the memory of objects seen. Of 10 words that are heard, 6.85 are remembered; of 10 words read, 6.92 are remem-

bered ; of 10 objects presented to view, 8·28 are remembered—a larger number than when the objects are named without being presented. This proves the superiority of the objective method of teaching in schools.

Almost in complete agreement with these results are those of the investigations of Münsterberg, who would seem to have proved that the mean of the errors is 31·6 per cent. in the exercise of the aural memory (repetition of figures or names of colours pronounced by other persons and not seen), while it is 20·5 per cent. for visual memory (repetition of the series after the subject has seen them).

Further, the beautiful experiments of Whitehead ('A Study of Visual and Aural Memory Processes,' *Psych. Rev.*, New York, 1896) confirm, in the main, the results obtained by Münsterberg. These experiments prove that with vision less time is required to fix an impression than with hearing. Below are two columns of figures showing the times required by different subjects for learning visually and aurally :

<i>Visual Memory.</i>	<i>Aural Memory.</i>
1·41 of a second.	2·38 of a second.
2·15 " "	1·52 " "
2·18 " "	2·32 " "
2·34 " "	2·54 " "
2·35 " "	2·37 " "
2·45 " "	2·47 " "
2·43 " "	3·0 " "
3·11 " "	4·33 " "
4·41 " "	4·42 " "

Retentivity, however, seemed to the same writer to be stronger in the case of matters memorized aurally. Hawchins ('Experiments on Memory Types,' *Psych. Rev.*, 1897) thinks the aural memory stronger than the visual in young people, and he found that the proportion of words retained by children between eight and twelve years varied from 42 to 80 per cent. in the aural series, and from 30 to 65 per cent. in the visual series.

For the rest, we all know examples of special memory for music, for figures, and for faces. The fact of the facility of fixation for certain categories of impressions in some senses rather than in others, is proved by a long series of observations—among them those of Guicciardi and Ferrari, on the mental calculator Zamboni.

The problem of retentivity—conservation—has been more clearly stated by Ebbinghaus in this question : 'How much is retained under given circumstances ?' He made a number of experimental researches, through which we have arrived at a knowledge of the different capacities for conservation of motor, acoustic, and visual

images, and some combinations of them (Cohn, Whitehead and T. Smith, Binet, Galton).

The strongest proof of the difference in development of visual and of aural memory in different men is afforded by the valuable researches of A. Binet in his study of the memory of great calculators and chess-players (*Psychologie des grands Calculateurs et Joueurs d'Échecs*, Paris, 1894). As is well known, the eminent chess-players, who play from a distance, must have a great visual memory to give them the representation of the chess-board, the pieces, their colours, and their relative positions. It matters little whether this is concrete visual memory or abstract visual memory, as Binet says. If it be true that the chess-player does not represent to himself, as Taine thought, the form and colour of the piece as in a mirror, also the positions of the pieces and their possible moves, yet it is none the less so that this memory cannot be distinguished from the other concrete memory of the pieces and of the chess-board. What these men possess is a form of geometrical visual memory that has already been described by many writers.

Others furnish examples of marvellous aural memory. At fourteen years Mozart wrote down from memory the 'Miserere' of Allegri, after hearing it but once in the Sistine Chapel. Such examples might be multiplied.

Conservation varies with age, as is shown by the experiments of Jacobs, Bourdon, and others. By making some pupils repeat a certain number of series of figures, letters, monosyllables, dissyllables, or trisyllables, immediately after hearing them pronounced, Bourdon found that from the age of eight upwards the pupils made hardly an error in the repetition of the series of five figures, four monosyllables, or four dissyllables; but they could not repeat, without a remarkable number of errors, the series of ten figures, ten letters, or eight words. This power of immediate memorization varies between eight and twenty years. Progress is most rapid, however, from eight to thirteen years, and is barely sensible from fourteen to twenty. Much importance is to be attached to the fact that children are equal, or perhaps superior, to adults in the fixation, conservation, and recall of recollections; but adults are much superior in the selection of what they will remember—that is to say, they exercise very much more control over the memory by volition than children do.

Fixation and conservation are not one and the same thing. It is quite common to meet with individuals endowed with ready and facile perception, and who consequently learn much and learn it quickly, but who do not retain it long or well; whilst there are others who require more time to learn, but conserve the impressions and cognitions for a very long time. Of these people we say that they have a faithful and tenacious memory. Facility of fixation and also of conservation depends not only on the circumstances

already mentioned, but also on the congenital aptitude of the individual to retain certain classes of images in preference to others.

Two other questions have now to be examined :

1. What is it that is conserved ?
2. In what part of the brain is it conserved ?

The first question is in part included in what we have already said in our general observations on the memory. It is well to confess, however, that we do not know the true nature of the cellular or reticular modification that is the certain physiological fact, which we must absolutely presuppose if we are to be able to form even an empirical conception of conservation in memory. From the anatomico-physiological point of view, we must of necessity admit that the modification, whether dynamic, physical, or chemical, that arises in the nerve-cell or in a zone of neuro-fibrillar reticulum is permanent, though perhaps in its continuance it is less intense than immediately after the action of the stimulus ; but it does persist, for the reproduction of what was once perceived would be quite inconceivable were there not a certain degree of permanence in the modification effected on a certain part of the central nervous system under the action of the stimulus.

It will be well to glance over the hypotheses that have been put forward on this subject. What, however, is needful, rather than merely useful to know, is that we are able to remember not only what is furnished by the senses in the form of images of the external world, but also the secondary products of percepts in the infinite combinations to which they may give rise in the field of consciousness and in the unconscious.

Mental life would be simple enough if there remained fixed only the external stimuli that have resulted in images on the cortex of the brain, but it is certain that, besides these, all the secondary products derived from the infinitely numerous combinations that each image enters into with the mental content of the individual are likewise fixed and conserved. Further, the same happens with all the emotive states provoked by single stimuli in the most widely different conditions of mind. Here, naturally, we observe a greater variety, and this has given rise to contradictory assertions. As the emotive states are not so easily reproduced as images and thoughts, some have maintained that they cannot be reproduced at all.

The solution of the psychological problem is not easy. The examples adduced by Ribot and by Titchener are not convincing either one way or another. How are we to separate the emotive element from the ideative element in recollection ? If a jealous woman groans as she thinks of the estranged love of her husband,

or his mistress ; if a father is moved to tears when his mind recurs to a recent illness that almost brought him to the grave ; if a soldier, as he recalls the past, feels the emotions of a disastrous battle in Africa, and is elated by his own heroism, then the jealousy, fear, and pride are reproducible only through a series of concrete images with which they are associated. It will be the image of the mistress or of some other woman that awakens the emotion of jealousy ; it will be one of the numberless images which disturb the mind of the father who is anxious for the welfare of his children that causes the flow of tears, especially at a short interval after the danger has passed ; it will be one of the many episodes of a battle, passing momentarily over the field of consciousness, that will re-evoke the emotions of that memorable day. As we see, the ideative component is never wanting, and that renders the solution of the problem very difficult.

There remains, however, the fact that, after all, the emotions are not so well conserved as concrete images and thoughts, and so our thoughts can be recalled, dissociated from, and tending always to be more completely dissociated from their strong emotive colouring. Notwithstanding the efforts of Ribot to convince us of the conservation and therefore the reproducibility of emotion, it is my opinion that, except in certain morbid states in which the emotional potential prevails over the ideative, we are bound to incline to the opposite doctrine, held by Titchener and others—namely, that an emotional state is conserved and is reproduced only in so far as it is associated with intellectual formations, and it is evoked by the representation of these latter.

I have excepted morbid states, but there may also be an association that escapes the immediate psychological examination of the subject. It is in this way that we are able to explain the case mentioned by Pardo of a medical friend who was obliged to rise in the middle of the night for several weeks to assist his sick father. Some time afterwards, when called during the night to start early with a picnic party, he suffered the same anguish as when he was awakened to assist his father. This is an example of reproduction of the emotion without any ideative representation, but in this case the association is of the hour with the recollection of his suffering father that had remained in the unconscious. We all know that certain emotions are habitually associated with certain hours. This notion has been clearly expressed by the great Italian poet :

‘Era già l’ ora che volge il disio
Ai naviganti e intenerisce il cuore
Lo di c’ han detto ai dolci amici addio.’

Nor can we exclude an imaginative association in the case of Toulouse’s patient. This was a case of amnesia retro-antegrada, produced by great mental suffering in a young woman. While

incapable of fixing actual impressions, or of having ideative recollections of a fixed period of time, she refused to go and see Dr. Toulouse, hinting vaguely that he had acted improperly towards her, because on her first visit he had raised her clothes in order to examine the knee reflexes. To me there seems to be very little probability in the interpretation given by Toulouse when he says that it was not the actual recollection of his treatment that had offended her, but the recollection of the disagreeable emotion that attended it. As a matter of fact, the raising of the garments may give rise to an idea of carnal violation, or of an offence to honour, and it is this second psychic product, which is intellectual-emotive, that is fixed. At the same time, the recollection of the act cannot be excluded.

It is certain that the greater portion of the emotion disappears, but all the stronger participations of the *ego* in the perceptive or intellectual movement are commémorable. On this point poets and psychologists are at one. By the side of the residua of perceptions we must place the residua of emotions and of reactions, with this difference, that mnemonic reproducibility is at its maximum in the former and at its minimum in the latter.

† As to the seat in which the so-called images are conserved, I have already said enough on this point in the chapter on perception. For many years I have maintained that concrete images are the products of the combination of elementary images. From this point of view the hypothesis of Sergi and of Ribot as to the physiological associations in the process of perception, and therefore also in the processes of conservation and reproduction, is up till now the best founded and the most probable that has been put forward. By the same general law, which is the foundation of every doctrine of memory, those same anatomical elements to which the stimulus has arrived under the form of a nerve-wave, in virtue of its physical properties—those same elements that underwent the special physiological modification required for the formation of the elementary components of concrete images—must also concur in reproduction; and the elements formative of these concrete images are also the conservers and the reproducers of the images and their components. The doctrine of Munk, Wilbrand, Henschen, Vialet, of the transmission of images from the anatomical elements of formation to those of conservation, although it has also been maintained recently with singular warmth by Sollier, has no solid foundation. The duplicates of the elementary components of images migrate, so to speak, in order to combine with others and constitute a concrete image; further, the duplicates of the concrete images migrate to a common field, where they come together to form new combinations and images of a higher order, such as those of the words that express

them, and of the abstract concepts of which these are elementary components. In this continuous movement of images and of their components we have the key of intellectual life ; but to affirm that images are formed at one point and conserved at another, from which they are re-evoked, appears to me a most arbitrary hypothesis, with little shade of probability.

Wundt supposes a general organ of apperception, which is the frontal lobe, and particular centres that are incapable of registering images, but capable of retaining the disposition to reproduce them, which is thus reduced to a functional tendency of the central nervous elements that have once already undergone modification induced by external stimuli. The centre of conservation is therefore the centre of apperception.

Sergi does not attempt to define the seat of conservation, but pays attention only to the most general facts of perception and of conservation, in which every observer may recognise a great deal of truth, except perhaps in details. He holds that if the excitation of the nervous elements were to last for a long time, they would be wearied out. External excitations do not give a definite sensation except when they are repeated, and the sensitive elements both of the centres and of the periphery adapt themselves to the actual excitation. The nervous elements of the periphery and of the centres are thus associated for a determined form of sensation, and they adapt themselves to this special mode of excitation, become specialized, and so give rise to cerebral localization. It is the internal central excitations that persist and that are conserved and reproduced. This process—special to reproduction—which awakens a group of perceptions associated by means of a perception that has been directly provoked, he calls *induction*, whence the law, formulated by him, of the *induction of perception*. This law is based on—

1. The habitual modes of psychic manifestations, and, consequently,
2. Localization in the element that is active.
3. Association of functional elements corresponding to the association of the perceptions.
4. The provocation at the periphery, or at the centre, of one of the perceptions of the associated group, or the excitation of a functional element of the associated group.

According to Sergi, therefore, conservation takes place in the same associated groups of nervous elements in which the perceptions arose. Sollier does not allow that this happens in the same nervous component as the perception. He criticises the hypothesis of Richet, and expresses himself as follows :

If A* were really modified at each excitation, as happens with a muscle, memory would be abolished. As a matter of fact,

* Here A stands for the nervous element.

the excitation H reaches the cell A and modifies it, so that it becomes A'. To this state A' there corresponds the representation that we have of H, which we shall designate by *a*. In order that *a* may be awakened in us and may constitute a recollection, it is necessary that the state A', to which it corresponds, be itself reproduced. Now, this does not happen if we admit with Richet that a new excitation H, identical with the one that produced A', modifies the cell A' and transforms it into A''.

The representation *a*, the psychic equivalent of H, can no longer correspond to this modification. Instead, there will be a new representation, *a'*. In this way H, exciting the same cell, will be successively represented in the mind by *a* and *a'*.

If A'' is substituted for A', just as A' was substituted for A, admitting that the state A' can never be reassumed by the cell A, it is impossible to understand how the image *a* could reappear. Its place is taken by *a'* just as the cell A' is replaced by the cell A''.

This critical conception of Sollier has a great value, and even an appearance of truth. But the clear-sighted psychologist has not given due consideration to the fact that in memory, as in the successive perceptions, we are dealing, not with a single nervous element, but with associations, which are always different in successive periods of time. This fact is connected with the changing conditions of the consciousness and of its content in each unity of time.

If we adopt this mode of interpreting the phenomenon of perception and that of memory, we must substitute for Sollier's formula another, into which enters the element of association; and in this case, if we represent the associative potential by N, we shall find that A, modified the first time and transformed into A', reappears always in the same identical manner under the influence of identical stimuli, is not transformed into A'', and therefore cannot be substituted. The recognition is connected with the other component N in such a way that in the successive stimulations we shall have A'N, A'N', A'N'', A'N''', and so on.

If this is the case, the condition of memory is not oblivion, as Ribot says; but memory depends upon the infinite associative formations, to which each anatomical component makes its own proper contribution, corresponding to its specific function, which it has formed and conserved throughout all the successive formations under the influence of the external and internal stimuli conditioning the phenomenon of recognition and reproduction.

Recognition, one of the components of perception, through which a percept is put into relation with another at a different time, is to be interpreted through the historic process of consciousness, the content of which varies at each moment of time, while it is into this content that the new percept must be received.

Another argument favoured by the upholders of a centre of conservation distinct from the centre of perception, is drawn from

the disproportion—due to a false calculation—between the number of percepts and the number of cells in the mantle of the brain. The number of perceptions is calculated by some at about 20,000,000 per annum. If in one day we are conscious of 54,000 excitations received, in a year that amounts to 20,710,000, and in sixty years we should have 1,242,600,000, a figure which, according to Sollier, is almost equal to the number of nerve cells of the brain; but according to the most recent researches of Hammarberg, confirmed by Thomson, these cells amount to 9,200,000,000, a number much superior to that of the percepts that a sane man can form throughout his whole life.

The greatest difficulty arises when we consider the very large number of secondary formations which can be fixed and conserved like the percepts.

When we consider that thousands of combinations can be formed with a very few numbers, those that are possible with hundreds of millions, and with an almost infinite number of secondary products, are beyond the powers of the strongest arithmetical imagination. But this difficulty is not avoided by the doctrine of transmission, which is preferred by a select number of physiologists and psychologists in all countries.

Those who favour this doctrine maintain that the conservation of impressions is not possible in the centre of perception; that the conservation of images, and therefore of their records, takes place in another part; and that when the perceptive centre is destroyed, these persist, only they cannot manifest themselves. This may lead them to hold—as, in fact, they do hold—that the so-called perceptive centres, described in detail in the first part of this work, are only centres of reception of excitations from the periphery, and that their function is to transform the excitations, so as to render them suitable to be received in the first place and evoked afterwards.

This doctrine cannot be maintained; it contradicts all the postulates of physio-psychology on an anatomical basis. Every operation of the cells under external or internal stimuli leaves a trace—chemical, physical, or dynamic. This trace is the fundamental fact of memory, and is translated into a specific dynamic potential, which the nervous element furnishes whenever it comes into a condition identical with, or analogous to, that in which it assumed relations with the external world and with the other anatomical components of the brain. The product of which it is capable under the influence of external stimuli is always the same by nature, but enters into combination with other products through the infinite associative paths, uniting with one another the various elements in the brain.

Sollier establishes an analogy between this conservation and the magnetization of a strip of steel. The capacity for magnetiza-

tion, just like the receptivity of the brain, does not increase beyond certain limits ; it diminishes with time, just as our recollections grow weak, and it is maintained in force if a piece of nonmagnetized steel is placed in contact with the magnet, in the same way as a recollection retains all its clearness if it be left in contact with an impression that is associated with it. To me it seems probable that images can be transmitted, as words are transmitted from apparatus to apparatus by telegraphic wires.

We shall see shortly, when we come to speak of evocation, how we interpret evocation in any region of the brain that is not the region of conservation, and how little probability attaches to the affirmation of those who locate the seat of conservation and of evocation in the frontal lobe.

Reproduction is divided into two, according to time—evocation and reproduction, properly so-called. Evocation precedes reproduction, and is voluntary or involuntary. Every percept, like every image that is formed, evokes other images, with which it has associative relations of various natures. Over this phenomenon the will does not exercise absolute and exclusive power. The music of a pianoforte heard at a distance arouses numberless aural and visual images ; the song of the nightingale evokes the visual image of the winged nocturnal singer, of the night, of the forest, etc. ; a gun-shot heard at night calls up an infinity of images and of emotions. These are examples of involuntary evocation, and we may formulate the law that every image, at the moment it penetrates the field of consciousness, exercises evocative power over other images, independently of the will. Such power varies in degree, according to the intensity or to the vivacity of the image, according to the existing patrimony of percepts and secondary products, and according to the emotive exponent of the image itself and of the subject.

Voluntary evocation consists in a conscious and voluntary direction of the mind towards the premeditated recall of a determined image, of things, persons, relations, places, events or verbal images, such as names, verbs, concepts, etc. In this the will is not always fortunate, for even though we know that we possess the object of the evocation, hidden momentarily among the infinite coils of oblivion, it may be deaf to the most anxious evocatory efforts of the will, and evade the most active search of our labouring desires.

It appears clear, therefore, that involuntary evocation is performed by some active point of the cerebral mantle, and that voluntary evocation is performed by that psychic component fixed by the will in the field of consciousness. As it may be visual, aural, tactile, etc., the respective area will be the evocative centre. Most

frequently, however, it is intellectual syntheses and abstract concepts that demand for their development the representation of the infinite images from which they have resulted, and in this case the frontal lobe is the evocative centre.

According to a certain psychologist, the image is evoked at the point of conservation, and reproduced at the point of formation. Here I have pleasure in reproducing the words of Sollier : ‘ . . . The centre of reception becomes the intermediary between the subjective state and the objective state, and when it happens to be destroyed, the reciprocal transformation of the one into the other can no longer take place. Recollection can therefore have its seat in a part distinct from the centre of reception, and so may not be able, when this centre is destroyed, to manifest itself under an objective form.’ And further on : ‘ . . . For the moment, what we must bear in mind is that the centres of perception are in reality only centres of reception of the excitations at the periphery, necessary for the transformation which renders them fit to be perceived and afterwards evoked ; but these centres are not the seat of the perceptions or of recollections.’ According to Sollier, therefore, the impressions on their passage do not leave the respective images in the sensory centres, or centres of reception, as he calls them. These centres are destined, instead, to subject peripheral excitation to that transformation which fits it for perception in consciousness.

Some assume that the frontal lobe is the field of conservation, and therefore of evocation. It is difficult to understand why the frontal lobe should be the organ for conserving and evoking images. Here arises logically the question of the disproportion between the number of nervous elements and the number of images, and the solution of that question on this basis could only be disastrous to such a doctrine.

All images are conveyed to the frontal lobe, not to be deposited there just as they are, but to enter into combination with others in order to constitute more complex psychic products, in the same way as the elementary components of single images meet on a different field to form a concrete image. Every time, therefore, that a thought arises, there comes an order from the frontal lobe to the separate organs that form and conserve the concrete images of objects and of words, to bring forward all their products of concrete images for the development of the concept of which these are elementary components. When I propose to myself to give a lesson or a series of lessons on the nerve-cell, I have only the abstract or complex concept of the nerve-cell. The part descriptive of the cell is referred to a greater or smaller number of visual concrete images and of verbal images, which have their proper seat at the place of their formation.

In this case, evocation starts from the abstract concept, and is turned upon all the direct and collateral components from which

the formed concept results. This example will instruct us still further. If, while I am reproducing the images of the various parts out of which the nerve-cell is constructed, I give each one of these its proper name, we have reproduction of phonetic and kinæsthetic images that are not in that moment recalled by the frontal lobe, or, as we should say, by the abstract concept, but directly by the separate visual images of the components of the nerve-cell, each one of which is associated with the verbal image of the word that symbolizes it. The 'tick-tack' of the clock or the strokes of the morning bell give me immediately the visual image of the clock or bell, as the case may be, as well as a vision of the breaking day, and also the words for all these things. The evidence of these facts obliges us to formulate the general law that *any point of the brain reproducing its own content in consequence of a stimulus, external or internal, is an evocative centre of all those psychic and physiological products with which its own product stands in any relation whatsoever.* At the utmost we may speak of the different evocative power of the frontal lobes and of the sensory zones, properly so-called. The frontal lobes and the evolutive zones exercise their power of evocation over the whole surface of the brain, whilst the power of the other zones is either limited to one or two sensory areas, or, if it be exercised over a much more extensive field, this is due to the awakening of generic or abstract concepts, which in their turn re-evoke their elementary components over all the cerebral mantle.

Another argument is adduced in support of a distinct centre of evocation in the frontal lobe, which, according to this hypothesis, would have to be also a centre of conservation of images. This argument is drawn from an examination of aphasia, and further on we shall go into it more fully. By this path, again, we should come to deny that the sensory centres are centres for the formation and conservation of images. For the present it is sufficient to remember that the so-called parrot speech (*echologos*) will overthrow all such arguments.

In this form of dysphasia, due to interruption of the logo-sensory paths and the centres of intelligence, the words spoken by others are not understood, because the correlative nervous waves do not reach the field of intellect. All the same, the patient repeats the words as a parrot does, and this is proof of the evocation of the corresponding image pre-existing in the acoustic sensory centre, of its passage to the motor centre, and of the evocation *in loco* of the tactile-motor image without the intervention of the apperceptive centre.

Those who maintain that the frontal lobes are the organs of evocation deduce another argument in favour of their doctrine from the painful sensation of effort, amounting to actual pian, that we are conscious of in the frontal region when we endeavour to reproduce something that we are sure we once knew, but cannot recollect at

the moment. This feeling of pain in the frontal lobes may well be the organic resonance of the work of the supreme regulative organ—excitant and inhibitive—which comes into play in the process of voluntary evocation, in which the whole psychic personality takes part, especially in the development of abstract concepts; but it does not authorize the conclusion that there exist in those lobes the centres of the formation and conservation of images, because, as we have just seen, evocation is subsequent to association, and is not the exclusive property of the frontal lobe, but is regulated by the same laws as regulate association.

Reproduction succeeds evocation, but sometimes arises independently of it. Herbart had already insisted strongly on the tendency of ideas to reappear (*Vorstellungsthätigkeit*). This thesis has been subjected to examination and to experimental proofs, by which it has been confirmed, thanks to the observations and researches of Ebbinghaus, Mueller and Schumann, Jacobs and Münsterberg, Paneth, Baldwin, Bolton, Kirkpatrick, Binet and Henry Jastrow, Scripture, and many others. From all these studies there stands out clearly the fact that, if the copy of things as ideas in memory is the only mode of conceiving memory, yet, inasmuch as it is much weaker with respect to actual sensations, it is impossible to pass over a number of subsidiary elements that concur in the reproduction, coming from all the mental phenomena associated with sensation.

These last accompany the reproduction, according to the same law as regulates the fixation of the psychic processes that are associated with a sensation, or provoked by it in the fields of intellect, emotion, and movement. The number and the force of the associated phenomena vary according to the nature of the sensations and their associative power. Here we behold clearly the same fundamental law of association in the mechanism of memory as in that of perception.

We have, therefore, to consider two modes of reproduction—the one that follows upon voluntary or involuntary evocation, and the spontaneous mode, not provoked by any representation in consciousness, but by the sum of all those internal stimuli and of psychic facts of unconsciousness, that accompany the apparently autochthonous reappearance of an image that surprises the consciousness.

As we have already observed, it may be agreed that the seat of reproduction does not coincide with that of evocation. Evocation is always performed by another psychic component belonging to some one of the hierarchic grades of which the mind is constituted; but reproduction can take place only in the actual centre of formation and of conservation of the percepts and their derivatives. Evocation is the process by which a psycho-nervous wave reaches the centre of conservation and excites the reproduction. The

centre of the latter must be in a state of excitability—that is to say, must possess a potential that permits of the reproduction and the representation of the percepts. Hallucinations and some dreams are reproductions that occasionally have not been evoked ; just as we may have evocation without reproduction, on which matter we have already said sufficient.

Recognition is, in the opinion of some, another moment of the mnemonic process. By it, when we perceive an object, a person, or a place that has previously fallen under our senses, or when we represent to ourselves a thought that had already been formed, we judge that these are already known to us, and were at a former time the object of our perceptive or formative effort.

The power of recognition has been subjected to experimental study by Binet and Henry, and by Bourdon (*‘Observation comparative sur la Reconnaissance,’ Revue Philosophique, 1895*). Bourdon pronounced within the hearing of the subject of the experiment a series of letters and words at the rate of one letter or one word every second or every half second, taking care to place the same letter or word twice in the series. In this way he managed to determine the interval between the two words or letters that is most suitable for the process of recognition. Thus, for example, in a series of eighteen words the interval at which fewest errors in recognition are made, is nine words—that is to say, that recognition is easiest when the same word occupies the fifth and fourteenth places.

According to Bourdon, in recognition there is a more facile and more rapid perception, accompanied by a sentiment that is intellectual in origin. This is in great measure in agreement with the hypothesis of Lehmann and Hofding, who think that recognition is conceivable only through associated reproduction, which embraces the motor phenomena associated with attention (Hofding), the feelings of pleasure or pain that accompany the perception (Kölpe) and the corresponding words (Binet).

Recognition and reproduction must not be confused with revivification, although it is easy to see that the three phenomena are of the same nature. Recognition and reproduction are predominantly objective, whilst in revivification the subjective element assumes great importance. In the process of revivification the subject is transported, and is surrounded by the same psycho-organic conditions as on a former occasion when something happened that had a great interest for his personality. Every accompaniment revives around him, and he is present at the old scene, reproduced in the same objective and subjective conditions. Here we have a more complex reproduction, which, differing from simple reproduction, is the result of the labour of the whole of the brain, and is

associated with very strong emotional states, which in their intensity are very similar to those accompanying the actual scene or the real event, although they be the production of fancy.

We now come to examine the question whether evocation and reproduction are phenomena so bound up with consciousness that consciousness is one of their necessary conditions, or whether the mnesic process may come into play independently of consciousness, when consciousness would have to be considered only as an accessory condition. Consciousness is not a substantial fact of the mnesic process, as we shall see in a subsequent chapter; it is a phenomenon, one of the forms of activity of the nervous system, and therefore it is not indispensable to the process of thought, which is conditioned for the formation and reproduction of ideas, relations, etc., through the associative links that establish relations between the various factors of thought, acting quite independently of consciousness.

The mechanism of memory is unconscious; nevertheless, we distinguish a conscious memory and an unconscious, or, to express ourselves with greater precision of language, a conscious and an unconscious side of the mnesic process.

In the same way as organic relations are established in the progress of the perceptive process, according to the laws of association, with or without consciousness, given the action of stimuli operating upon the nervous system, in an equal degree there are reproduced the same facts, the same modifications that the nervous system once underwent, through the influence of the same or analogous stimuli or their psychic derivatives, independently of consciousness.

That the phenomenon of memory is not necessarily conscious everyone may judge for himself from a number of facts within his own experience.

Names or other words, for example, that sometimes we cannot recall at will, come into consciousness when we are actually thinking no more about them. Events of a long-distant past break into consciousness and interrupt the course of another order of ideas, or they reappear in dreams.

Certain sensations and certain movements may have been conscious for a certain time, but they become unconscious through repetition, and are perfected through fixed relations of the organic mechanism. For example, the art of walking was once conscious, when the child had to learn the various movements with great effort, and to co-ordinate them duly, so as to maintain its equilibrium. Later, through long repetition of the corresponding states of consciousness, the mechanism was gradually driven out of consciousness, so that in the adult it acts independently of consciousness (automatism).

When walking has already become an automatic process—that is to say, when the organic memory has substituted itself for a memory

of consciousness and volition—there is no further volitional element in it than the objective towards which it is directed. How much volition is there in the speech of an individual? What does he know beforehand of all the words that must succeed one another in the expression of a given thought, when at a given moment of time there can remain in the visual field of consciousness only a very limited number of representations? Certainly we fix the abstract concept that we wish to develop, the synthesis, often included in a single word; but ideas and words follow one upon another by force of association between the multiple elements from which the abstract concept has been gradually formed. The same may be said of the writer, the pianist, and so on.

It sometimes occurs that certain phenomena do not reach the visual field of consciousness, and yet they may be produced independently of the will and in certain particular states. So, even when certain things be not learned because the learner does not pay due attention, they may be reproduced under special conditions. Mnemonic reproduction is therefore neither strictly bound up with apperception nor with voluntary registration.

In some phases of hysteria, in hypnotism, in dreams, under the influence of powerful stimulants of the cerebral mantle, or in some other form of morbid hyperactivity of the brain—mania, etc.—we may represent to ourselves objects, persons, places, verse, and prose, thoughts known or formed, all of them buried in the ocean of oblivion, from whose depths no power of volition could ever have drawn them to the surface. It is superfluous, therefore, to admit that, with or without volition, the nervous system receives, conserves, and reproduces, and that in the process of memory, as in the greater number of mental phenomena, consciousness has only the duty of imprinting its particular character.

We may formulate the general laws that govern the mnemonic function. One of these is as follows:

An impression is so much the better retained, and therefore the analogous modification of the nervous system is so much more easily reproducible, the more intensely the impression has acted. The strongest states of consciousness are those that pass most forcibly over its field, and these are more easily represented; whilst the weaker states remain latent and are reproducible only in states of superexcitation.

The same effect is observed when attention is strongly concentrated on the most powerful elements of association, with reference to time and space, in which case all the other less highly coloured images that have various bonds of association with these, including more especially those of time and space, gradually reach the field of conscious memory. Those very strong impressions we call points of rendezvous—a happy phrase introduced by Ribot—and they are just the ones that have most intensely stimulated

the nervous system, those in which the *ego* has participated most strongly.

At various periods in life, and especially in childhood and youth, events happen and sensations succeed one another, leaving very strong impressions at a determined moment in the period of the formation of the personality—strong, perhaps, because they are new ; these impressions are what the adult man principally and most frequently represents to himself.

The memory of those facts appears always to dwell on the threshold of consciousness, ready for representation, and such impressions have the strongest power of invasion of consciousness. In the revolution of the psychic constellation these impressions, with their accelerated motion, tend always to enter into consciousness, whilst to represent less vivid memories an effort of volition is required, and also a search for points of rendezvous that will enable us to re-evoke all those other images that cannot for the moment be called to memory.

Every person may prove this truth for himself by the introspective method of psychology.

Of all the events that happen in our daily life, the one most easily represented is that which has caused our minds to vibrate most strongly. Emotion and interest of the *ego* in the impressions are the conditions of a ready and certain evocation. This fact is bound up with the law of the intensity of the stimulus.

How often does it happen that we cannot recall a name, or that instead of the name we remember only the sound of it, or the sound of its accented syllable ! For example, in the words Michele, Antonia, Arnaldo the accented sounds are respectively *e* in *che*, *o* in *to*, and *a* in *nal*. Now, it is frequently the case that the fundamental sound is remembered, while the whole word is not, and I think for the reason that the accented sound has made a stronger, and therefore less unstable impression, whilst the whole word, which is a more complex and therefore more unstable composition, fades from memory more easily. Thus the sound of the accented syllable very often becomes the rendezvous for the word, through which we recollect all the other parts that go to make it up.

Not all men present the same mnesic disposition for the various forms of images. There is a notable difference among men, and this is certainly one of the most substantial reasons of differences in intellect and in conduct.

As will easily be understood, three main orders of images enter into the constitution of thought—the *tactile-motor*, the *visual*, the *aural* ; and even when we consider the higher mental products, such as words, we find that these are formed of the same orders of images (see Part I., p. 135, *et seq.*).

Owing to the very different circumstances under which the lives of individuals are developed, and especially for reasons of

heredity (Ribot), the various parts of the brain are not all developed proportionately, and the inequalities in their evolution cause inequalities in function, which are expressed in the readier formation of images and in the more certain and durable conservation of these, likewise in their readier reproduction, with more colouring, in those parts of the cerebral mantle that are most evolved. In this way mnemonic types are formed among men, who, for this reason, must have diverse inclinations, tendencies, emotions, and aptitudes according as there is predominance of visual, aural, or tactile images in the complex formation of the mind. From the point of view of memory we can thus classify men as motor, visual, and aural.

We do not stop to consider the division into conceptual and sensorial, because, as will be pointed out in the next chapter, the conceptual exist only through the representation of the words that synthesize the concepts, and therefore we find ourselves again in a sensory field, except that here the content is of words. Conceptual men may also be divided into motor, visual, and aural, according as kinæsthetic, visual, or aural word-images prevail, and therefore are represented in the formation of words.*

* This classification of men according to their mnemonic qualities is very rough indeed. Individual varieties are innumerable, and depend upon age, sex, race, and the different mental development of individuals. In this regard the investigation made by W. Colegrove ('Individual Memories,' *Amer. Journ. of Psychol.*, 1898-1899) is of very great value. He deals with 1,658 replies to the same list of questions sent to different persons, who in turn made an examination of themselves and of persons of their acquaintance, including infants. With regard to age, the investigation includes groups of individuals aged 1 to 4, 5 to 9, 10 to 11, 12 to 13, and so on up to 20 years. From 20 upwards the groups go by decades—20 to 29, 30 to 39, and so on up to 90 years. The memory in different individuals develops in a very different measure at successive ages. It is important to note that memory attains its highest power in the decade from 20 to 29, and is maintained at that level, with some diversity of character, in the succeeding decade, 30 to 39. In this last decade logical, intellectual, and topographical memory reaches its maximum both in men and in women, and this holds also of memory for numbers and for time. In the next decade, 40 to 49, memory for persons begins to fail. In this investigation there is much that is of very great value for teachers, who might draw largely from it in their studies of mnemonic-technical processes, and the heedless and ignorant compilers of the schemes of study in our schools would also gain by reading this report. In these investigations and in many others they would find convincing proof that it is impossible to present the same thing under a new form, as is done, without any method, in grammar, geography, and history, without confusing the mind and weakening the most important of mental energies—that is, the memory. There we may find a rich fountain of knowledge to enable us to apply the law of selection logically in our schools. Thus, for example, we very often find a memory that is retentive of history and literature conjoined with incapacity for original thought, and a notable weakness for mathematics. From all these studies we learn clearly the hurtful influence of distraction on the process of memory, and this, expressed in common language, is equivalent to a denunciation of the very great harm that scholastic programmes and, in a less degree, the methods followed in the greater number of our high schools and academies, do to the freshness and force of Italian thought.

The history of the arts and sciences gives us an extraordinary number of examples to prove these facts, which, indeed, are no longer contested.

Most painters show a great prevalence of visual memory, and especially great vivacity in the visual images of which they have representations. From Raphael to Rubens, from Morelli to Michetti, all display readiness and vivacity of visual images, easily reproduced with high colouring. The well-known and highly-esteemed Neapolitan artist, Alfonso Simonetti, whom I had to treat for a serious head trouble when I was beginning my career, and who recovered after a few months, surprised me by offering me a canvas with a very faithful portrait of myself, although I had never given him a sitting, and he had no photograph of me.

Musicians, like poets, are generally aural, and the disproportionate development of the cerebral region in question, and therefore of the aural memory, appears very early in life in many cases.

Mozart, Beethoven, Petito, and all the great pianists and composers, were, with regard to their surprising aural memory, genuine examples of marvellous physiological hypermnesia. Poets, like orators, are sensible—as if they heard them—of the harmonies of rhythm, of phrase, of sounds, independently of the ideative content of their works of art.

Bain says that ‘inclination towards some subject—botany, zoology, antiquities, music—is innate in us, and this is often said with reason. The powers of the brain must from the very beginning incline us strongly towards a certain class of impressions, and to these we shall come to direct our intensest study.’

As for what is innate, we must recognise the law of heredity (Ribot) which explains how in whole families of artists the same mnemonic phenomenon is repeated, sometimes with marvellous progressiveness. It not infrequently happens that a modest dilettante in painting gives us a great artist, just as Mozart the father, of slight ability, gave us the great Mozart the son, and as Madame Petito, the dilettante pianist, gave us that marvel of a son whose psychological figure has surprised so many students of psychology.*

As a rule, the predominant cerebral development is not limited to a single sensory area. When we study these great artists we never find aural, visual, or motor memory exclusively. Generally we find visual-motor, as in sculptors and painters, ‘who have their eyes in their fingers,’ or aural-motor, like orators, poets, singers, etc.

I am of opinion that, in this regard, there are no men with absolute equilibrium of development. In very few cases have I been

* Petito, a Spanish child, was mentioned by P. Richet in the Psychological Congress held at Paris in 1901. At three and a half years this child knew by heart a score of whole pieces of music, harmony and melody. At two and a half years he repeated on the piano, unaided, a musical composition that a musician had presented to his mother, whom he heard practising it on the piano.

able to find an equal participation of all the categories of images in the highest formations of the mind, and in the manifestations of life ; further, those with minds most nearly balanced, owing to the various conditions of existence and to their exercising one sense more than another, end by having a certain predominance of one category of images over the others.*

Anomalies of memory are almost all by way of defect, and they may be general or partial. Anomalies on the side of excess are also found, but it is very difficult to draw the line of demarcation between the physiological and the pathological mnemonic process, when the memory is quick and faithful. When the brain is especially reproductive it is inferred from that that a higher potential of the intellectual patrimony of the personality is available ; that is always to the advantage of the personality in its individual and social relations. Should a person speak or write logically from morn to night, provided his words be opportune and to some purpose, no one will argue that he is not of sound mind merely on the ground that he has *hypermnesia*.

The ideal of the sane man is the maximum of efficacious activity. I have known orators speak, without interruption or fault, for seven hours on end, always observing a rigorously logical structure of thought, and using a very large vocabulary, which is wholly based on memory. Such cerebral activity is desirable in a much greater number of men than those who really possess it.

Hypermnesia per se is not a morbid phenomenon. It is the facts that accompany *hypermnesia* that give it its truly morbid character. The changed tone of the personality, superficiality of attention, errors in perception and in judgment, inefficacy of thought, errors in logic, strange actions, doubling of personality, as in some phases of hypnotism—these are the concomitant psychic phenomena which, along with the somatic phenomena, cause us to consider *hypermnesia* morbid.

In our everyday life how much there is that we do not remember ! All that has not very strongly impressed us, that has not awakened intense states of consciousness, we have great difficulty in evoking at will, or at most our representation of it is pale and incomplete. Sometimes it happens that we awake in surprise during a dream, and at the moment we have a lively representation of the scenes of the dream, but these fade away gradually, and it is impossible to recall them—they are drops lost in the ocean of oblivion. Such

* We must not overlook the fact of the prevalence of one category of images over others, a characteristic generally inherited. This reveals itself in special likings of children, and it is a matter of the very greatest importance for teachers, as it would be useful to favour and cultivate such natural inclination, by applying the law of differentiation which is fundamental for human progress. This does not mean the neglect of the education of the other senses, but such natural inclinations are one of the keys of fortune both for individuals and for collective humanity.

is the fate of an indefinite number of impressions. 'In the practical use of our intellect,' says James, reproducing almost verbally the thought of Ebbinghaus, 'forgetting is as important a function as remembering.' Locke says, 'Our minds represent to us those tombs that we are fast approaching; where, though the brass and marble remain, yet the inscriptions are effaced by time, and the imagery moulds away.'

Under some special conditions, however, certain records of real impressions and of positions beheld in dreams recover their colouring, and are revived. Under the action of certain stimulants, like tea, coffee, or alcohol, when the tone of the brain is exalted, when the circulation of the arterial blood is accelerated, we can remember many things that never recur to the mind in our ordinary state. In mania the memory is exalted. Individuals originally sober in speech talk a great deal under maniacal excitement, speaking of many things that had never formed the theme of thought or discourse in their normal state. An unwonted number of recollections are recalled from the depths of memory, either by other images or by the most insignificant actual stimuli. It would seem that a vivifying wave traverses that great world of living entities in a state of lethargy—the world of oblivion.

The memory may be exalted in hysteria and in natural or induced somnambulism, and in the past such exaltation has led people to accept as miracles facts that have since been demonstrated to be phenomena of nervous physio-pathology. A young woman fell into a state of somnambulism. Years before, when in her bedroom, she had overheard her uncle recite certain psalms that he was reading in his Bible, and although she did not understand what he was saying, not having education enough to follow or to fix the lines in her memory, yet in her somnambulism she could repeat these psalms that had not made either strong or conscious impressions on her nervous system.

History tells of certain epidemic forms of hysteria, such as the *chorea major*, the victims of which set forth on pilgrimages to various shrines, leaping and dancing, singing hymns that they had never learned, and speaking tongues they had never studied.

Facts of ancient date, that seemed to have disappeared for ever from the world of memory, come to life again during the excitement of fever, in the delirium of intoxication, or at the beginning of slight meningitis.

Cases are not infrequent in which individuals, mostly uneducated, begin to speak in some strange language that they do not know, to the great astonishment both of the bystanders and the speakers themselves.

Some hysterical subjects can also write pieces of prose and verse of which they had no notion in the sane state. Richet says of somnambulists that they remember places, persons, and events

with an incredible degree of exactitude. A hysterical subject was able to sing the second act of 'Africana' when he was in a hypnotic sleep, but could not remember a single note when awake. Another, who when awake could not remember a quotation from a book, however hard he tried, remembered the whole passage, the volume, the page, and the paragraph when he was in a hypnotic sleep (Moury). Examples might be multiplied. I myself dreamed one night and repeated with the utmost clearness some Russian words from an article by Kowalewski which I had seen, but not understood, for I do not know Russian. These words I had so clearly before me when I awoke, and for a few moments after, that I was very much surprised, and for a time pleased myself with the thought that I possessed a very superior faculty, a newly-acquired power; but, half an hour later, I had completely forgotten the words, and I have never since been able to re-present them, although for the moment they appeared so familiar to me.

In such cases imagination creates nothing new: it only effects the reproduction of what was once registered by the nervous system, but cannot be reproduced at will.

We have, therefore, an anomaly of memory on the side of excess, which would not constitute a pathological fact if it were not that it represents one of the factors of a morbid whole that is much more complex and various. In the maniac it is one of the phenomena of the great excitability of the whole brain; in somnambulism it is exalted at the expense of perception, of attention, of judgment, and of will; in hysteria it may be at most one of the most brilliant pictures of the morbid kaleidoscope and nothing more.

Hypermnnesia of this sort reflects the evocative and reproductive power, and is to be referred as much to the facts perceived or thought of, and then forgotten, as to those conserved, so to speak, unconsciously, of which the subjects appear not to know even that they form part of their experience (Guillon, *Essai sur les Hypermnnesies*, Paris, 1897).

Exaltation of memory may be partial. This has its counterpart in physiological life, but the phenomenon is truly morbid in some cases of defective development of the nervous system. As we have observed previously, there are individuals who, owing to their organic constitution or their habits, can reproduce certain images much better than others.

The phenomenon is really pathological, and is of no little importance in certain cases of defective cerebral development. With imbeciles, in whom such functional asymmetry is frequent, corresponding of necessity to anatomical asymmetry that results from greater development of one part of the brain than of the others, partial memory of one order of images is very strong. Such a fact should not surprise us, and it is not even exceptional, when we

consider that many artists, men of letters, scientists, etc., who are hypermnesic for many things, prove themselves amnesic imbeciles as regards other things that are quite ordinary and even essential in life.

There are imbeciles who can read a page of print without understanding it, and repeat what they have read, word for word (Ireland, Drobisch reported by Ebbinghaus, Sollier).

The memory of weak-minded persons, even when it is highly developed, is of no service. It rests upon associations of contiguity, and therefore imbeciles are incapable of detaching the parts of which a representation is constituted from their ordinary relations. 'Imbeciles,' writes Sollier, 'always repeat things in the order in which they have learned them. . . . If, for example, they have learned the days of the week commencing with Thursday, and they are asked to repeat them beginning with Monday, they cannot do it.'

Such a state of affairs has its counterpart in certain individuals who are well evolved. I know some persons, even highly-gifted persons, who resemble Dr. Leyden, mentioned by Ribot. Leyden could repeat a long Act of Parliament after a single reading, but when he wished to recall some particular point in what he had read, he could do it only by repeating from memory the whole passage, from the very beginning down to the point that he wished to recall.

Other imbeciles have a very highly developed memory for numbers. Some can work a multiplication or a division by several figures mentally, giving the product or the quotient correctly and rapidly (cases of Ireland, Zuccarelli, and others). These examples among phrenasthenics, even of an extreme degree of weakness, find a counterpart in those great arithmetical and mathematical geniuses of whom we have already spoken, such as Henry Mondeux, Rinaudi, Diamandi. The report presented to the French Academy about Henry Mondeux, said that he required only five minutes to learn and keep in mind a number of twenty-four figures, while he had the greatest difficulty in remembering the names of persons, places, and things.

Binet says of Rinaudi that his forgetfulness of matters relating to ordinary life is in glaring contrast to his enormous memory for figures, which is about a hundred times greater than the average in normal men. He could repeat thirty-six figures without a mistake in the same order as he read them.

Others show true hypermnesia for tactile images (tactile hypermnesia).

Some imbeciles or idiots repeat passages of music perfectly,*

* Sollier, Ireland, Wildermuth, Bernardini, and Ferrari have made a study of the memory for music in phrenasthenics. In one hundred such subjects, the two last authors found twelve with highly developed sensibility

or they can reproduce, more or less accurately, mechanical contrivances that they have seen but once. Griesinger speaks of an imbecile who could with comparative exactitude make a model of a ship, complete in all details, after he had seen it by the seashore.

We must also note verbal hypermnesia of certain given things and of names of a fixed order. A patient in the asylum at Naples remembers the names of the saints mentioned in the calendar for every day of the year. Ask him to what saint any day of the month is dedicated and he will not fail to give a correct and ready answer. In all these cases, however, the phenomenon has a pathological value, in so far as it is in contrast with the great mental poverty of the subject.

Sometimes hypermnesia is partial, applying only to single facts, to the revivification of events forgotten for many, many years, or that happened in infancy or childhood. The scene from 'Mignon' is reproduced in some cases collected by Guillon. Here is one of them: In the year 1793 a mother and her child, aged six years, were conveyed in a waggon to one of the great squares of the city of Orleans, there to be executed; but whilst they were awaiting their turn, a priest induced them to make their escape. The child remembered nothing either of the city or of the particular occurrence except as a distant dream. At the age of thirty-one she chanced to go to live at Orleans, and one day, as she turned out of a street on to the Place Martroy, she suddenly beheld again the whole of that terrible scene—the same square crowded with people, the fatal platform at the end, the waggon on which her mother was lying and praying. She swooned away owing to the terror produced by the vision.

Defects of memory are total or partial. The former may be temporary or progressive. There are cases in which an individual affected by a given malady forgets all that has happened to him during a period of his life, which may be very short or very long, hours, days, or weeks. This blank in consciousness is, as a rule, never filled up.

Epileptics remember nothing of what has happened to them or what they have thought or done, not only during the convulsive attack, but in some cases also during a period preceding the convulsion and another period following it; and if a psychic attack has taken the place of the convulsion this amnesia continues for a time after the attack is over. This phenomenon is almost characteristic of epilepsy. I say 'almost' advisedly, because it must not be considered as a constant fact, since Tamburini and others have

and memory for music; twenty more understood music, and could repeat a musical phrase, but soon forgot it; sixteen could hardly repeat a note or the rhythm of the passage. In the remaining cases no results were obtained, owing to the bad disposition of the subjects or their incapability of attention.

recorded authentic cases of epilepsy in which the memory of many things was preserved. The epileptic, like the person who has suffered from shock following a serious injury to the head, often finds it difficult or impossible to connect the present with the normal period preceding the attack or the injury (amnesia retrograda).

A few years ago a Major of the Bersaglieri rose one morning as usual, made his toilet, gave his attendant orders to saddle his horse, arranged a few other matters, then went to the stable and mounted.

After going a certain distance the horse shied, reared and became so excited that the unfortunate Major was thrown from the saddle, striking his head against a stone. He was picked up, but remained unconscious for more than a day. After his recovery, which was very slow, he was unable to remember anything that had happened on the morning of his serious accident, although fully restored to health.

He remembered the whole of the day preceding his accident, and everything that had occurred right up to the hour when, as usual, he went to bed. He could not remember rising in the morning, giving the order to saddle his horse, mounting the horse, or even any of his emotions just before being thrown.

One August evening, a Roman lady, who had gone to Rome on business in the morning, was returning in an auto-car to Porto d'Anzio, where her husband was awaiting her. She was alone with the driver, who, as night was coming on, went at a high speed. At a turn of the road they came upon a waggon drawn across the way, causing the driver to stop very suddenly and reverse the motor. Consequently the auto-car plunged and overturned, and the lady was thrown out, striking the ground with her head. A little later she was picked up in a state of complete unconsciousness and carried to a hospital in Rome. She gradually recovered consciousness, was medically attended, and taken home.

When she came to herself she was conscious of her surroundings and of the men and objects in the hospital; she spoke with the doctors. On reaching home she recognised the persons belonging to her family, and addressed them in appropriate words. When she awoke the following morning she had complete loss of memory of everything that had occurred. I saw her four days later, when she had recovered all her vigour and the vivacity of spirit for which she was known, but she could not remember entering the auto-car at Rome, or the long stretch covered on the road to Porto d'Anzio. Her recollections were somewhat confused, and ceased about two hours before her departure from Rome. On the other hand, she remembered nothing about the hospital in which she had regained consciousness and spoken with the doctors; nothing of her removal

to her own house, or of the first day that she passed there, when she spoke to the members of her own family (amnesia retrograda-antegrada).

The literature of the subject can now show a great number of cases of amnesia retrograda, anterograda, and retro-antegrada. I have added to the bibliography of the phenomenon two unpublished cases that are very instructive to the reader. The interpretation of the phenomenon itself presents great difficulties.

Why should an individual who has risen from bed in perfect health, has thought and acted regularly from six till nine in the morning, after meeting with an accident at nine, not be able, when he recovers consciousness, to take up the thread of his life at the hour of the accident? Why can the thread be resumed only at a point several hours earlier?

I suppose that the whole series of thoughts succeeding one

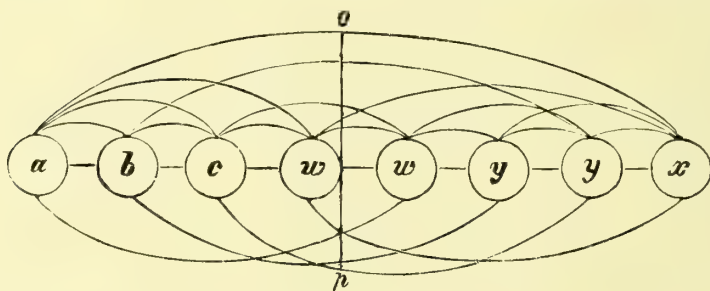


FIG. 62.

another in consciousness over a longer or shorter period, in a particular disposition of the mind and with a particular objective, are lost. This leads to the predominance of an imaginative product, with which are closely bound up many thoughts and acts formed and carried out during a longer or shorter time.

Let us suppose that the officer whose case I have mentioned, when he awoke in the morning, was thinking of his excursion on horseback, and represented to himself the places he would pass through (*w*) and the point he would make for (*x*); that he was occupied with his toilet, enjoying the pleasure of thinking what a figure he would make on horseback (*y*), and that he gave various orders all relating to his sport—*a*, *b*, *c* (see Fig. 62). We shall then have a complete organic consciousness, of which no part can stand alone.

Further, the consciousness is wholly occupied by that series of images, emotions, and acts, which, taken all together, form a conscious thought of longer or shorter duration, commencing in the case of the officer at six in the morning, and projecting itself forward to twelve noon, the hour fixed for his return home.

In the diagram this state of consciousness is represented by the circles *a*, *b*, *c*, *w*, *y*, *x*, which constitute a whole in association.

If the accident ruptures this state of consciousness along the line *op*, let us suppose at nine o'clock, then the single components—which have no separate existence, but form part of the whole that is definitely and violently broken through along *op*, and which therefore ceases to exist—cannot be represented in another state of consciousness.

It is well to admit that such an interpretation is only hypothetical, and perhaps not applicable to all cases. Contrary to the supposition of D'Abundo that amnesia retrograda does not involve any event that has forcibly impressed or interested the subject, there are cases, such as that related by Brown-Séquard and reported by Ribot, in which the amnesic period covers events that are really central points in the life of every person, such as marriage.

Sometimes immediately after the psycho-epileptic attack the recollection of part or of the whole of what happened, or of what the subject did, persists. This recollection lasts only a short time, disappearing later on, and the subject can never recall it, especially if an epileptic attack intervenes between this state and the normal. The probable explanation is that the state of consciousness characterizing the psycho-epileptic attack continues for some time longer, and so the subject remembers, as does the somnambulist, what cannot be recalled after the recovery of normal consciousness (amnesia-antetrograda).

Among very numerous cases I remember one of severe epilepsy, in which the subject one morning, without any reason whatever, killed his wife by repeated blows with an axe. He remained impassive in his own room beside the dismembered corpse. When the gendarmes came up just after, he recounted the whole matter in detail, and justified his crime after the manner of an epileptic. A little later he was seized by a convulsive fit, and after it he remembered nothing, nor could he explain to himself why he had killed his wife, although he had given reasons in detail to the police (amnesia retrograda-antetrograda).

Cases of amnesia antetrograda are more intelligible if we admit the duplication of the consciousness, as in somnambulism.

The same thing happens in some cases of hysteria and, generally speaking, always where the brain is disordered in consequence of a strong nervous discharge, in which case it works within a very circumscribed range of psychic activities, in a spasmodic state, and furnishes associations that are not usual to the normal psychic personality. When the personality has reassumed its legitimate power over all its conscious mental acquisitions, the spasm or the constriction being over, a free path being open to the psycho-sensory waves and to the normal emotions, and the paths of association being restored, the individual can recollect nothing that is not an

emanation of something that is truly part of the order of ideas and tendencies of his personality. Since all the moral and intellectual acquisitions, the acts, and the sensations of this state of spasm of consciousness are in contradiction to the personality, or have not assumed any relations with it, they are therefore not reproducible.

Periods of general amnesia are sometimes observed as the culmination of a syndrome that has remained isolated as an episode in life, or is repeated several times at longer or shorter intervals.

I here report an observation made upon a patient affected by a psychopathic syndrome that is a masked form of epilepsy, and might be characterized as *amnesic insanity*.

Vet. Luigi di Giuseppe of Naples, aged thirty-nine years, unmarried, a waiter by profession, was admitted to the Provincial Asylum for the first time on January 14, 1894. Nothing is known of his family history. When he was a few months old he had convulsions for the first time, and as a result one eye became atrophied (?). He was always of melancholy disposition. After receiving an elementary education, he attempted to learn the business of a hatter, but had to give it up, owing to defective sight. For the same reason he had to cease working as a tailor, and he then commenced to act as a waiter. At twenty-four, he had a fit of profound depression; he attempted to commit suicide, but his courage failed him. Shortly after this attempt he left his home, and was found on the Campo di Marte. Of this he has no recollection. At thirty-four, he went to America and remained there three years. He then returned to Italy and continued steadily at work. In November, 1893, however, he began to suffer from a certain weariness and depression, and, as he himself expressed it, he had no memory. It became part of his duty to follow his master to the country for a month, and he there declared that he was incapable of serving him, which caused him much affliction. On December 26, 1893, he received a certain order from his master, and this caused him considerable uneasiness. He showed signs of agitation, left the house, and, without any reason at all, went to Baiano, covering many kilometres on foot. He had left Naples at ten in the morning, and at eight at night the police saw him in the district mentioned, looking wildly about, and, as he could give no coherent account of himself, they took him to the police office. He remained in a dazed condition, without sleeping, until the next day. In the course of the morning, after he had been questioned several times, he showed astonishment on finding himself in that place and in a district that was unknown to him. He told his name, but could give no reason for his journey. He was three days without eating, taciturn, sorrowful, and a prey to great anxiety. On the fourth day a brother came to see him. The sufferer recognised him, but

could not remember anything that had happened to him during the past four days. He burst into tears, saying: 'If my malady were known, endless misfortune would befall me.' After he had returned to Naples and recovered his normal health, he wished to take service elsewhere, and was engaged by a gentleman in Somma, but after three days, instead of going there, he went elsewhere, was seized with the greatest anxiety, took no food for three days, and had aural hallucinations. He imagined he heard his master whistle, and would run to the window, calling, 'Wait, wait!' Sometimes he would say that he wished to go to America.

He had no recollection of these occurrences.

On the occasion of this second fit, on January 14, 1894, his family sent him to the asylum. There the patient was calm, but heedless of everything. He did not recognise his own condition or the nature of his surroundings. He kept himself huddled up in bed, looking suspicious and dejected. On being questioned he gave always the same answer: 'Let me go. I must start for America. My friends are calling me.'

From his attitude and his air of suspicion it was inferred that the patient was a prey to hallucinations, the nature of which he wished to keep hidden. He was incoherent and confused. For two days he refused food, and he was for a long time without sleep.

On physical examination he showed the following characteristics: irregular contractions of the oro-labial muscles, especially the elevator of the lip on the left side, when he spoke; his articulation of *r* was not very marked (rotacism).

From January 18 he commenced to improve, and on the 20th he was able to recognise the place he was in, and seemed to suffer much on finding himself in an asylum. However, he maintained his dejected and suspicious airs, and, what was a matter of importance, he showed a complete loss of memory of a long period of time. He thought that it was December 26, and remembered nothing subsequent to the moment when he received the order from his master and went to Baiano. His recollections connected themselves perfectly with the day preceding his flight to Baiano, but from that time on up to January 20 nothing was reproducible.

For some time his memory remained weak, but it improved during the month of February. His personality was gradually recomposed, and the deficiency of memory became more restricted. It was limited to the day of the first fit—he did not recollect what happened to him from the 26th to the 27th—and to a few days of the second fit, for he could recollect nothing from January 15 to 20.

Though attempts were made to give him connecting facts for the two periods mentioned, the two lacunæ were never filled up.

As he showed no further disorder, he was dismissed from the asylum on March 4, 1894.

Three days afterwards he was again admitted, in a state of great

agitation. He was weeping, and did not recognise the place to which he had been brought. He commenced to improve almost immediately, but he was never able to recollect that he went to his brother's house, or the agitated nights he passed there. Amnesia of the period passed in that house continued. He remained in the asylum until April 29.

On August 13, 1900, he was brought back to the asylum for reasons similar to the foregoing. The patient said that from time to time, in the midst of his work, he suffered from mental disturbances, not knowing where he was or what he was doing. These disturbances arose without any cause whatever, and sometimes happened several times in a day, until he would fall into extreme confusion. He was never in convulsions. During these attacks he always did strange things, without having any recollection of them. He would run away from the house and go into places quite unknown to him. Once, in 1897, he went to Nocera on foot. In the last few years his history presents numerous long periods of complete amnesia.

The most classical form of total or temporary loss of memory is that presented by the so-called *duplication of personality*. The history of hysteria and of somnambulism furnishes very considerable material in the way of observation of individuals who, under given circumstances, show a change of personality, which is characterized in its new state by new aptitudes, unusual ideas, a new mode of feeling, a new attitude, and new forms of reaction. Those presenting this phenomenon have perceptions and normal relations with the external world; they recollect their past in such a way that the primary consciousness continues in the second state without interruption. If after a certain time they leave this second state and reassume the primary, they do not recollect all the period of time in which they were in the state *B*, if we represent the normal state by *A*. The moment at which they pass into that new state of consciousness, designated *B*, is reattached to the moment at which they return to *A*, the whole interval of the state *B*—it may be hours, days, weeks, months, or even a year—disappearing completely from memory, and remaining incapable of reproduction.

During this phase the subject may do a number of things that are rational and logical, just like the action of any normal man, but of these there will be no recollection when the sufferer returns to his primary state.

The most original and interesting case in the whole literature of the subject is that of Camuset, reported by Voisin. The subject was a certain V. Lois, seventeen years of age, son of a woman of evil life. From childhood he had been given to vagabondage and begging. A few years prior to observation he had been arrested for theft, and taken to the reformatory of Saint Urbain. There he worked in the fields, but, falling ill, he was transferred to the

asylum of Bonneval, suffering from paralysis and atrophy of the lower limbs. In the asylum he was considered a respectable youth, of good character, gentle and grateful; he awakened much interest by the recital of the story of his past life, and of the thefts he had committed; also by his protestations that for the future he was determined to be honest.

He remembered everything that had happened to him in the reformatory of Saint Urbain, his friends there, the work that had been given him, and he told a touching story how one day, when he was lifting a bundle of faggots, he had taken into his hand a serpent, which, however, slipped away without biting him. Consequent on his emotion he suffered convulsions and loss of power in the lower limbs, and therefore had to be transferred to Bonneval. He remembered well his impressions on passing through Paris.

As he had paraplegia, in the asylum he was put to learn the profession of tailoring, in which he made rapid progress. About a year elapsed, and one morning, when he was working in the tailors' shop, he had a severe fit of hysteria, that passed through various phases, and, with its repetitions, lasted about sixty hours. When the fit was over he wished to rise and dress himself; he asked for his clothes, dressed partially, took a few steps in the room—evidently the paraplegia had disappeared—and called for his companions to go to work in the fields. He thought that he was at Saint Urbain. He did not recognise either the doctors or the nurses, or even his comrades at Bonneval. He would not admit that he was paralyzed, and he could remember only that 'the other day he was much frightened by a serpent that he had taken in his hands.' He remembered nothing of his removal to Bonneval or of the time he had passed there; nor had he any recollection of his passage through Paris, or of the tailors' shop, or of the art of tailoring that he had learned. He said that they were trying to make fun of him. At the same time his character became completely changed; the same disposition that he had shown when he was detained at Saint Urbain returned, so that he became querulous, ungrateful, of bad conduct, and arrogant. The lacuna of memory, extending over a year, always remained with him.

Many years ago I had under my charge at Naples a Jewish girl of seventeen years, who used to fall into a somnambulatory phase from time to time in the course of the day, often without any definite cause and without preceding convulsions. This would happen when she was in the midst of some domestic work. The people of the house noticed nothing but her change of disposition, and also that if engaged in conversation she would break off, or if she was working at embroidery, as was her custom, she would stop her work, go into the kitchen, and start housework. At other times she

would begin an animated conversation with a sister who was not in the house.

If those present attempted to draw her into conversation, she would take part in it, but in a most monotonous fashion, without spontaneity and without initiative, like some person who was absorbed in a matter extraneous to the conversation. When she reawakened, she used to wonder at not finding herself in front of the embroidery frame, at which she remembered she had sat down to work. She recollected nothing of what she had seen, heard, said, or done during the interval.

When I was teaching in the University of Palermo I saw a very intelligent girl, the daughter of one of my colleagues, who was affected by a variable and extensive hysteric syndrome, having but recently recovered from amblyopia hysterica. Every evening, almost at the same time, the girl would fall into a somnambulic state, and assume a psychic attitude decidedly different from her ordinary.

She changed from a sad, preoccupied, unexpansive, fastidious and torpid individual to a good-humoured person, expansive, lively, and active. She lived in a village, and one evening her brother arrived from Palermo. She received him gladly, kissed him, and talked with him, as had been her custom before her illness, being very fond of him. In this disposition of mind she went to bed, but when she arose in the morning she was astonished at meeting her brother there; she asked how and when he had come, and remembered nothing of her conversation of the past evening. She was sad and irresponsive, and treated him with coldness.

This condition of matters lasted about a year, and during that period the girl was conscious of only half of the time that she lived—from the morning until four in the afternoon.

The late Professor Tommasi once asked me to examine and to report upon a young man of a strange nature. He knew him as a neighbour, and was interested in his vagaries and in his illness. Legal proceedings were instituted against this youth for these reasons. One day he met one of the city guards, who was on point duty at the steps leading from Via Pontecorvo to Piazza Dante, and invited him to follow, while he made a perquisition in a house in that street. At first the policeman was uncertain what to do, but the youth ordered him to follow, giving himself out as a superior officer of the Department of Public Security, and the man obeyed. They made their way up the steep street, entered the gateway N, and knocked at the door of the house occupied by Mr. X, an advocate, who was not at home. The lady of the house opened the door. He then said to her: 'In the name of the law, I must search your house for important documents that are believed to be there.' The commotion into which the poor lady was thrown, and her entreaties

were quite ineffectual in stopping him. After having turned over some letters and books, he ordered the policeman to follow him. They left that house, and, when they had reached the slope of Pontecorvo, he ordered the guard to return to duty at the point that he had left, while he himself mixed with the people on the Piazza Dante. In consequence of this affair the advocate lodged a complaint, and proceedings were taken.

The accused remembered nothing of the matter with which he was charged, and showed extensive lacunæ of memory. Among other matters, he had forgotten the period and the circumstances of his marriage, which he could not explain to himself, and about which he was much troubled. He was acquitted. This case bears a great resemblance to that related by Morton Prinke at the last International Congress of Psychology.

If we designate the normal state by *A* and the state we shall call abnormal by *B*, we find that the state *B* is not always completely forgotten. In some cases there is, as it were, a half consciousness of that period, and it is remembered as a dream, sometimes fragmentarily. This feature is often met with in pre- and post-epileptic psychic states, and in some other forms of epileptic phrenosis, sometimes also in hysteria. A decided example of this was furnished by the Count, whose case will be treated more in detail when we come to speak of hysterical phrenosis in the third part of this book. When the Count had recovered from a rudimentary state *B*, after a convulsion, during which state he had been talking a good deal about himself, he came to me, who had observed him closely, and said : ' I don't know how ever I could have thought and done such strange things. . . . Everything that I said and did seemed to me to be absolutely true . . . and I remember, as in a dream, that time, which was very, very different from my real life. . . . '

The same thing is noticed in induced somnambulism. When all is said and done, it is possible to bring about a transformation of the personality by hypnotic arts, and all the impressions received and all the acts performed by the hypnotized person generally pass out of memory when the subject returns to his normal state. These things are remembered only when the hypnotic state returns, either spontaneously or after employment of the means by which it is usually provoked.

Some states of intense mania, some phases of sensory deliria, some brief episodes of melancholia (*raptus*), and the greater number of the manifestations of acute dementia, especially if hallucinatory, and of several other psychopathic states, may also fail to be remembered when the normal personality is re-established.

Under this aspect polyneuritic psychosis (Korsakoff, Colella) and melancholia deserve particular attention.

In polyneuritic psychosis the sufferer has perceptions of the

external world, and is logical in his speech and in his actions, but in a very short time he forgets what is said to him and what he himself has said. A distinguished lady who was attacked by this malady during pregnancy asked me the same thing over and over again without intervals, because she forgot what she had asked as well as the answer I had given her. In melancholia the memory behaves in very various fashions.

There are melancholic subjects who, on recovery, repeat the most minute particulars of what has happened to and around them, and there are others who remember the long period of their illness only as a dream. According to my experience, when there have been hallucinations, which generally induce disgregation of the personality, or when the deliria are well organized and have transformed the personality, the new percepts, that assume associative relations with the products of delirium, are remembered only in a confused way, when the deliria disappear and the former normal personality is resumed.

In a melancholic woman the change of kinæsthesia, and therefore of the nucleus of the personality, was so profound that she did not know her own self, and she was unable to recognise any of her belongings or her relations, including even her husband. She repeated constantly: 'This man keeps coming to me and tries to take care of me, but he is not my husband, because I was never married. I am not Mrs. X. She is dead. . . . Once that lady lived . . . but she lives no longer. They call me by that name, but it is not X who is speaking to you.'

'You,' she said to me—'it seems to me that I know you, but I cannot say who you are, nor do I know whom you came to see, or when I became acquainted with you. If you are coming for Mrs. X, as you say, you are mistaken, because she is no longer living.'

The reason of the phenomenon is different in the different cases recorded. There is no recollection of the state of severe mania, because of the great rapidity with which impressions and thoughts follow one upon another; and further, there is not sufficient time allowed for the formation and the fixation of the percepts. In the *raptus melancholicus* it is the emotive tension that has been for long preparing the nervous discharge of the inferior centres, which, as Jackson maintained long ago, perform their functions without the domain of consciousness.

In acute dementia there is a real dissociation of the personality, with more or less apparent loss of its more complex components, and disaggregation of the latter into their simpler elements; there is also a want of that associative process which is the condition of perception, and therefore of memory.

General defects of memory may be congenital or acquired. Congenital defects appear almost exclusively in weak-minded

persons whose brain is so constituted as not to offer the conditions necessary for the fixation of the impressions of the external world. The conditions required for the formation and conservation of percepts, and therefore for their evocation and reproduction, cannot be realized. Besides the partial hypermnesias already spoken of, whose products are of little utility, one of the surest characteristics of the feeble-minded person lies in his weak, fragmentary, and uncertain memory. The number of things that he forgets is enormous in proportion to what is found in a man of good evolution. He is slow, and has great difficulty even in his fragmentary reproduction of the strongest images, unaccompanied by the satellites that in greater or less number follow in their orbit, in normal men. His notions of time and place, if he has such, are evanescent and erroneous. The same defect of power and of material for association creates a great difficulty in the evocation of the mental content at his command, which is always poor with regard both to objects and words.

Acquired loss of memory is always the expression of changed organic conditions of the brain. In whatever manner and for whatever reason the brain departs from the normal conditions of existence, loss of memory is almost always the most conspicuous symptom. Acute infective maladies, abundant loss of humours, intoxication, infection, cerebral shock, exaggerated, intense, and unduly protracted intellectual labour (auto-intoxication), all give the same result.

Those neurasthenic persons who, with their small power of resistance, sometimes due to heredity, have abused their energies in one way or another, some in the struggle for existence, others in the orgies of pleasure, lose their memory. In the greater number of cases, loss of memory is the first protest lodged in the bank of consciousness, on account of a deficit that arises from outlay in excess of the original capital of memory, and disproportioned to the reintegrative power of the nervous elements, which latter is a condition indispensable to the maintenance of equilibrium in the balance of mental life.

Many young students feel that they have become more or less enfeebled, not only in their power of attention, and therefore of perception, but especially in their power of retention. This happens often after the leaving examinations of the *lycées*, which demand an expenditure of labour out of proportion to an intelligence which is sometimes poor, and to a constitution that is weak. Such youths learn slowly, and have difficulty in retaining what they learn.

The phenomenon of defect of memory, which may be temporary in some less serious forms of neurasthenia, is capital in all states of mental weakening, of whatever nature or origin, and is found in its highest degree in dementia.

Amnesia based upon cerebral degeneration (states of primary

or consecutive dementia, perhaps also neurasthenic dementia) is often progressive. Individuals afflicted by it gradually forget the better part of what formed the co-efficient of their psychic personality. Their mind is impoverished; their recollections become slower, less complete, more uncertain, they blend together and become confused; consequently, there are very numerous errors, due to substitution in the memory, and the exchange for one another of facts, places, times, objects, and persons. *Paramnesia* becomes very frequent, and this is the first step on the way to the so-called *delirium of recognition* and to the *dysmnnesia* of Morselli.

Sometimes it happens that the subject believes that he perceives for the second time persons, things, places, facts, and psychological states that are in reality new to him. This state of mind has been known for a very long time, especially to the poets. Dickens makes his hero, David Copperfield, say: 'And the strange feeling (to which, perhaps, no one is quite a stranger) that all this had occurred before, at some indefinite time, and that I knew what he was going to say next, took possession of me.'

To this phenomenon the name of *paramnesia* has been given. It is sometimes associated with painful emotional states—generally so, according to Lalande; but according to other observers, including myself, this is not the most usual case, for it is a psychic phenomenon in no way emotive, and by some (Dugas) it is not even regarded as a pathological fact. Again, according to some observers this phenomenon is quite common, almost all men being subject to it (Diedsens), while others hold that it is met with in only 30 per cent. of people (Lalande), and a little more frequently in childhood, an opinion with which Dugas agrees.

The phenomenon of paramnesia is complete or incomplete, and it is very difficult to explain. Several interpretations have been offered, and this fact, while proving that the matter has exercised the ingenuity of psychologists, shows also that the true explanation is not yet known.

We have to do with a double representation, in which the stronger element corresponds to the subject present, while the weaker appears to be projected into an indeterminate past.

In other words, perception would appear to be first unconscious and then conscious. The passage into consciousness of an unconscious perception gives the illusion of recognition of a veritably new state of consciousness (Lalande). According to D'Aniel, one of the two representations corresponds to the sensation, the other to the perception.

Sensation and perception normally succeed one another within an extremely short time, but where there is paramnesia the interval would appear to be longer, so that when the perception is completed by the association and localization of the sensation, that sensation

appears already known. Dugas seems inclined to hold that paramnesia enters into those states recognised as duplications of the personality, and, as a matter of fact, he gives the example of a person who was conscious of becoming another person. One of the subjects observed by him used to say : ' I heard my own voice as though I had been listening to that of a stranger, but at the same time I recognised it as my own, and I knew that it was I who was speaking ; but the *ego* who was speaking produced on me the effect of a *self* lost long ago and suddenly rediscovered.' Vignoli, with whose views Soury agrees, makes paramnesia dependent upon the awakening of mental images, ideas, and sentiments, through association, by the rapidity of the psychic process, and by the rapidity and constructive power of the imagination. The actual image, transported by an unconscious association back to an indeterminate and distant period, appears as the reproduction of past perceptions. The rapidity of the psychic process, which is an effect of the facility with which a new image arises, after the same fashion as applies to old images, causes the illusion, when the subject is not fully attentive, which makes us take a fact for a recollection (Biewliet). The observations of Sander, Pick, Forel, Kraepelin, and of Bernard-Leroy prove the frequent occurrence of a dreamy state accompanied by anguish (Kraepelin). Bourdon attributes the majority of errors in the recognition of words to phonetic analogies, *i* being confused with *j*, *b* with *p*, *fer* with *mer*, etc., or to analogies of meaning.

Fouillée considers the sensation of the ' seen before ' as a morbid phenomenon of echo and of internal repetition, an explanation just as obscure as that of Ribot, who writes : ' For my part I offer the following explanation of the phenomenon. The image formed is very intense, and is of a hallucinatory nature. It imposes itself on the subject as a reality, because there is nothing to rectify the error. In consequence, the real impression is relegated to the second place, with the colourless character of a recollection, and so it comes to be localized in the past. This hallucinatory state, although very vivid, by no means annuls the real impression, but as it is detached from that, and as it has been produced very rapidly, it must appear as a second experience.'

Here is what Thibault says on the point : ' A perception or an emotion actually perceived by a subject recalls to his consciousness, under the influence of certain causes—such as age, weariness, or intoxication, all of which induce fugitive excitation of one form of cerebral activity (the subconsciousness)—an analogous perception or emotion, formerly the object of perception, and then forgotten. This recall to memory through analogy is wrongly interpreted, because of its brevity and its rapid return to oblivion.

' It is accompanied by a particular strong affective sentiment (due to some unknown cause), which gives the phenomenon its vividness and its originality, and which cannot be controlled by

the momentarily weakened intelligence. The antecedent perception that is recalled cannot be localized in any fixed period, as the phenomenon of memory is incomplete and very short ; so it comes to be relegated to a more or less distant period of the past.'

I believe that the influence of dreams may have some connection with the phenomenon.

The illusion of having ' seen this before ' may give rise to errors of recognition, even to the extent of inducing the delirium that bears that name ; also to other illusions of memory with which the deliria of melancholic subjects are related, as, for example, when they attribute to themselves faults that they have not committed, or when they state that they have been hypnotized.

Sometimes it is the imagination that formulates conceptions, translated into words, and these by repetition gradually take the place of a construction identical with reality (*dysmnnesia*).

This phenomenon reaches its maximum degree in imbeciles and in insane persons, most of all in demented subjects who are still capable of composing thoughts and of having apperception of things that do not exist, but which they take for true. Sometimes they confound the false products of the acute period of their malady with reality.

It is a noteworthy fact that idiots have a fuller recollection of the few images at their command than imbeciles, who evoke images with more difficulty, and falsify the mental content.

Whatever be its explanation, the phenomenon occurs frequently even among sane persons ; but, in my opinion, it is always a pathological phenomenon of memory. It may also be held that there is a disturbance of the perception, in so far as perception contains in itself the fact of recognition, and consequently a mnesic disturbance, the frequency of which increases with the mental decay. It is very common in primary and secondary dementia, and most of all in dementia paralytica.

General defects of memory, which are, as a rule, progressive, usually follow a law that has been well formulated by Ribot.

The latest acquisitions, which are necessarily the least stable, as they have not had time to organize themselves and to assume binding associations with the others making up the psychic personality, are the first to disappear, so that in loss of memory the process is the opposite of that of the evolution of the personality.

The latest facts are usually the first to pass into oblivion, whilst earlier acquisitions, and especially the central points of the history of the personality, which form a sort of mnesic routine, and which have had time to assume more numerous relations of association with the various psychic contents at the time of the different historic events touching the personality, are much more easily and readily remembered.

In the process of dissolution of the mind and in the progressive decay of the memory power, these appear as fragments of an edifice that has fallen to ruin, testimonies sometimes of mental opulence and of good architecture, like the articles left in the *salon* of a decayed aristocrat, whose extreme poverty has caused something to be sent to the brokers every day. This general law is subject to certain exceptions. It is not to be taken absolutely, because past memories are not always preserved, nor are all of them retained—only a few, indeed, and those the strongest and most emotional. Many disappear and others fade away, the particulars being lost or confused, while illusions of memory are frequent. On the other hand, recollections of childhood and of youth are almost all lost. Until the personality is fully constituted, the records of the period of evolution are colourless, dull, few in number, imperfect, and unconnected. In traumatic psychosis, for example, images and recollections of particular objects are for the most part lost, whilst concepts and general ideas are preserved.

This law is demonstrated in a wonderful fashion by the way in which disgregation of the complicated organism of speech takes place. It is known that nouns are the earliest to be forgotten, whilst adjectives and verbs offer more resistance. The reason of this lies in the fact that the network of associations of the noun is of little extent in comparison to that of adjectives and verbs. At bottom the noun has little, and sometimes nothing, of substantial relation with the object designated. I do not know why table is called table, or why paper is called paper. It is different with verbs and adjectives, which indicate relations and qualities. Owing to the process of comparison, these assume more numerous and extended mental relations, and are therefore much more frequently called up. Words composed of several syllables disappear in many cases more readily than simpler words, the latter of which are also the first to be learned. The accented vowel of each syllable is remembered better than the word as a whole, and often enables the whole word to be recalled. When an individual knows several languages, those learned latest are the first to be forgotten, and his own language, the very dialect he spoke in childhood, is often the last form of speech that the decayed personality retains at its command. I have known individuals who knew Latin, Greek, and Italian, but who slowly forgot those languages one by one, according as they had been less thoroughly learned or less often put to use, until finally they were reduced to their own dialect, while even that was more or less impoverished.

We must remember how easily the memory of demented persons is exhausted. When a conversation is opened with them, their first replies are often to the point—*i.e.*, show the possession of an intellectual patrimony that is still considerable; but, after a few questions, they commence to wander. Here we find difficulty of

evocation and of reproduction, owing to which only a small part of the residual patrimony can be utilized ; above all, there is difficulty in associating recent perceptive formations with earlier ones. It is this difficulty of association that explains why, in states of mental enfeeblement, recent products disappear more rapidly than those acquired earlier, the latter having at command a more extensive network of association that facilitates their evocation and reproduction, even when they seem to have been lost.*

In states of weakness, as, for example, during convalescence from acute maladies, evocation is slower and more difficult. This may depend upon the smaller number of associated percepts, and the consequent inferior intensity of the waves exciting the activity of the centres of reproduction, which latter, for the same reason, are also found to possess a weaker functional potential.

Thus it is that demented persons who are ill-nourished, and in whom the mnesic process seems to be completely ruined, are no sooner put under a régime that favours their nutrition than the memory begins to improve also. (The same holds good with regard to sane persons.)

In this case reproduction depends upon the concurrence of a greater number of associated ideas, and this is proved by the fact that when the power of evocation is inefficient, even in sanity, a large number of collateral images are voluntarily evoked, by help of which the subject finally manages to recall the image temporarily lost.

Sometimes there are illusions of memory, as when we judge a past event that has made a deep impression upon us to be very recent, or when we think that a very long time has passed since the happening of some events of little importance, the recollection of which has partially faded.

In these cases memory suffers most in the process of localization in time. Some insane persons who have vague recollections, or none at all, of their childhood, occasionally affirm that they were born 1,000 or 3,000 years ago, or that they were never born at all.

Sometimes the subject forgets what he has thought, said, or written, and when he thinks, says or writes it again, it seems to him that he does so for the first time. The preacher mentioned by Ribot repeated from his pulpit the same sermon that he had delivered the previous week, and felt quite certain that he had been saying something totally different. Moury once wrote some reflec-

* The fact that the mnesic patrimony of demented persons is not altogether lost, but is in great measure simply buried and capable of being recovered, induced me, a long time ago, to believe that many cases of dementia could be restored to health by special methods of mnemotechnics. As far as possible, this is now being practised in my clinique.

tions on a question of political economy, but lost his manuscript, and did not write it out again. On being asked to send his article to a review, he set to work a second time and believed that he had thought out a new way of treating the subject. 'Two months afterwards,' he writes, 'I happened to find the lost sheets. Great was my surprise on finding here, almost word for word and in the same phraseology, what I had hitherto believed was the product of my very latest reflections.'

Decay of memory may be slow or rapid. An example of rapid loss of memory is often found after the apoplectiform seizure with which progressive paralysis is frequently initiated.

As a rule it is diffuse lesions, sometimes fine alterations of the brain, not localized, that give rise to such mnesic decadence. There exists, however, a form of general amnesia dependent upon extensive lesions of the frontal lobes. This I have already described in a paper published in *Brain*, 1895, 'On the Functions of the Frontal Lobe.'

I am now able to report an example of this form of amnesia, consequent upon traumatic lesion of the frontal lobes. I believe that few similar cases prove so much, or reproduce in the clinique, just as with the experimental method, a syndrome that is clearly recognisable.

Ber., of Naples, aged twenty-six, unmarried, shoemaker by trade, with an elementary education, was sent to the asylum from the prison of San Francesco, where he had been detained, after his conviction for resisting the police.

At sixteen years of age he had been condemned to three years' imprisonment for stabbing, and before he was twenty, he was again tried for brawling.

In August, 1894, in another fray, he was struck by a revolver bullet that entered the right temple and issued through the left frontal protuberance. He slowly recovered after treatment in the Hospital of the Pellegrini. When received into the asylum he was quite calm, and thought that he had come into a prison, but that did not trouble him, and he allowed himself to be examined and led into the observation-room with the greatest indifference.

On objective examination he shows a cross-shaped cicatrix on the left temporal region, and another cicatrix on the left frontal region.

The examination as to sensibility in all its forms and as to movement reveals no anomaly.

The pupillary reflexes are normal and the patellar reflexes slightly exaggerated.

On psychic examination he appears to be in a dazed condition. Always alone, avoiding company and conversation, he is to be found either stretched at full length on his bed or wandering about

in the hall, like a person who cannot tell where he is. He is undecided in everything he does. When questioned, he always gives an answer, and often to the point, showing on a first glance regular perceptions and quite a ready attention to simple matters, but this lasts only for a short time. Confronted with facts somewhat less common and more complex, he remains mute and perplexed. He cannot explain certain positions that are created for him, but becomes embarrassed and confused. His defective attention becomes evident on conversation with him. He often stops short, does not know what to say, turns his face the other way, is easily distracted, and it is necessary to give him hints to bring him back to the original subject. The disturbances of memory are much more important, for he forgets from one day to another, from one hour to another. He remembers only the most important facts of his life, those that have impressed him strongly. For example, he will relate the incident of the night of September 3, 1894, when he received a blow from a stick on the nape of the neck, and was shot with a revolver, the bullet entering the right temporo-parietal region and being extracted from the left frontal protuberance; but he himself declares that he cannot execute the simplest orders. For instance, he left the house to go a message for an aunt, but he was hardly in the street before he had forgotten everything, and he did not actually know where he was. When he did reach his destination he had no idea what he was to say or what to do. Many times he never reached his destination, and after wandering about for a longer or shorter time, returned home like a person bewildered.

His conduct appears to be correct, but his eye is fearful and his look inexpressive. Simple perceptions are readily realized, while the more complex are slowly, and sometimes not at all, effected. He has great difficulty in localizing himself in time, either present or past. His slow and poor ideation is clearly a result of his enormous difficulty of evocation. He complains of constant pains in the head, and often, as he himself declares, he sees stars passing before his eyes. Little things appear to him magnified and transformed, and he is conscious of this state of things. He has no true will, but rather whims, impulses, caprices, and facile reactions.

Even provoked attention, which at the beginning of the examination appears ready, is very soon exhausted. After the first few questions he falters. His personality is the result of representations, phantasms, and rudimentary notions, isolated and unconnected, like the ruins of columns without capitals and without arches. Association and differentiation of images, of ideas, and even of the simplest judgments, is either impossible for him or can be effected only with the help of other persons who know the facts, and lead him on by recalling objects, places, and persons that he recognises in his memory.

It is noteworthy that he perceives all external objects and

understands very simple language. The psychic process, however, stops at perception which does not provoke that more or less extensive movement of images that is found in the sane individual, and that he himself had, prior to receiving the wound on the head; perception remains isolated, or evocation is restricted solely to the complementary images that integrate the consciousness of an object, permitting it to be recognised on every occasion. Further, he lacks spontaneous evocation and especially voluntary evocation. He cannot reply circumstantially, determining time and place, whatever be the matter about which he is questioned.

This patient has remained a long time in the clinique in the condition described, though he has improved a little through re-education. The fact that he recognised objects and understood words proved that images existed and were reproducible, and that his defect was in the evocative power sustained by the process of synthesis, which is a function of the frontal lobe. Through this defect of synthesis his memory power was weakened.

Of partial disorders of memory some are open to psychophysiological examination, while others are still wrapped in obscurity as regards their origin and mechanism. Among the former the most notable example is supplied by the dysphasic disorders. If, on the one hand, these have furnished the most irrefragable proof of functional localization on the cortex of the brain, on the other hand, they offer examples of the most classical partial defects of memory.

If we admit it to be a demonstrated fact that the neuropsychic factors of language are localized in various and sufficiently well-defined areas of the cortex, and if we agree that the physiological signification of these areas lies in the formation and conservation of verbal images, sensory and motor, it is easy to understand that similar or analogous images coming from outside awaken those previously formed, and are therefore recognised themselves. These in their turn awaken correlative motor images, which are reproduced in the spoken or written word. It follows that the destruction or the arrest of function of one of these centres must of necessity cause impossibility or incapacity of mnemonic reproduction of all those images that have been formed during the course of life and stored up in the centre that is destroyed or inhibited. A person who is affected by word-deafness, through destruction of the first temporal convolution on the left side, not only does not understand the speaker, but he cannot himself speak in his turn, because the centre of conservation of acoustic verbal images has been destroyed, and these images constitute the most potent sensory excitant of the kinæsthetic centre of the spoken word. If that same centre were compressed or inhibited by a destructive focus situated in its neighbourhood (a condition that has caused some

to believe that there may be another centre for the recollection of words), the subject would understand a speaker, but would have lost a greater or less capital of mnemonic images, or he would be powerless to evoke them, so that he would be obliged to borrow others from without. This phenomenon has received the name of *aphasia amnesica*.

In like manner, were a cultured gentleman to suffer a lesion of the lower left parietal lobule, he would afford a surprising example of an individual who has conserved all his intelligence except the co-efficient x , which is represented by the visual graphic images that are normally represented each time the individual reads, and through which the significance of the graphic symbols—that is, of the written word—is recognised. He would perhaps lack as many words as were articulated through the representation of the visual graphic images.

An example of complete loss of the visual verbal patrimony in a visual subject I give as follows :

A lady who was received into my clinique was confused and agitated. On observing her attentively, I was able to ascertain that her confusion and agitation were due especially to the fact that she was affected by a certain degree of word-deafness. She understood only a few of the words that were addressed to her. It appeared to be a typical case of sensory aphasia, with which was associated a state of confusion and also psycho-motor agitation. A more careful examination brought out the fact that the incomplete word-deafness was associated with complete word-blindness (word-blindness with *agraphia*). This lady had been a teacher. She was well acquainted not only with Italian, but also with French, and she taught music. Now, she had completely forgotten music (*amusia*), so that not only was she incapable of recognising written words (*alexia*), but she did not even know the musical notes. Further, she never spoke, in consequence of the almost total loss of her vocabulary. She did not remember a single name. She made some improvement with regard to her word-deafness, but she retained complete word-blindness, with right homonymous bilateral hemianopsia, complete *agraphia*, great poverty of language, and sometimes paraphasia.

She remained in this state for more than a year, and was the subject of demonstrations. The diagnosis was word-blindness with incomplete word-deafness, due to a destructive focus of the angular gyrus and the surrounding zone, extending to the thalamo-occipital optic radiations. Three months before her death she was seized by another fit of vertigo. (Her illness began with attacks of vertigo that overtook her when she was in good general and mental health, and it was then that the psychic symptoms were first noticed, causing her to be taken to the asylum.) After this second attack of

vertigo she had complete word-deafness. She no longer understood a single word, whilst before she had understood several. She fell into a state of absolute indifference and apathy, not expressing a single thought or manifesting a desire or need. She would no longer pronounce a word, even though invited to, and, in short, she presented a state of complete dementia. Soon afterwards she died.

At the autopsy I found two foci on the external aspect of the left hemisphere, one limited to the middle and posterior part of the first and to a small portion of the second left temporal convolution, and the other on the left angular gyrus, extending a little way into the marginal convolution.

On the right hemisphere there was observed another focus, perfectly symmetrical with that found on the first and second left temporal convolutions.

To tell the truth, as this was the case of an educated woman who had been teaching for a long time, and as in course of time the word-deafness appeared to have improved in some degree with exercise, I had attributed the whole complex of symptoms to a lesion of the angular gyrus. I came to this conclusion from the persistence, with no sign of improvement, of all the symptoms of word-blindness and of hemiopia, whilst the improvement of the word-deafness was progressive; and from the probability that the dementia might well arise from a lesion of the angular gyrus in a subject who, as she had read much, must have utilized, in the process of thought, many more visual than aural word-images.

Further, there is the fact that, owing to the functional preponderance of the visual centres of speech over the others, word-deafness in this case might well arise from the lesion of the inferior parietal lobe, instead of from lesion of the first temporal convolution. This seemed likely, and the more so to me, as I had had the opportunity of observing an individual who had been a compositor, and as such had become visual, and I had found that he showed marked amnesia of words along with his word-blindness (L. Bianchi, '*Contributo alla dottrina delle afasie ottiche*,' *Ann. de Névrol.*, 1891). In this second case, the hypothesis was probable in so far as the practice of reading makes the mnesic evocation of the visual images of words more ready; in other terms, visual memorization is much easier than aural memorization. We may well agree that in those persons who have had long practice in reading, and who have learned much through reading, the motor centre of the whole mechanism of speech is not the aural but the visual centre, and this, each one of us may prove by observation upon himself.

The differentiation of the cerebral mantle consists in the formation and conservation of special groups of images of a higher order. To-day no one doubts any longer the constitution of a differentiated area in the occipital-parietal lobe for images and

recollections of places. If that area were destroyed, the subject would lose his recollection of places, and, though he might preserve his intelligence intact, he would lack that small co-efficient and thus would be incapable of finding his bearings, in whatever point of a city he might be.

If we agree upon the doctrine of the functional evolution of certain cortical zones of the brain, so that those which are termed the interlocking zones would not be latent, as appears to be held by some authors, but rather specialized centres for higher functions such as reading and writing musical notes, then functional inhibition or destruction of these zones, in a brain educated in music, will entail, as a necessary consequence, amnesia of all the manifestations of those particular functions, and that constitutes a loss of one's specific psychic capital. It is thus we explain aural or visual amnesia of the musical notes and of their associations (cases of Kant and others).

If the sensory substrata—optical, acoustic, or tactile—of the images of objects are wanting, the name that is attached to the object cannot be represented in memory.*

In these cases the subject is unable to name the object by the aid of vision alone. He must reinforce the insufficient optical representation by a series of actual sensory factors furnished by other senses (sound, contact, weight, etc.).

It is through the concourse of all these actual images that the name of the objects is forced into the field of conscious memory.

Aphasia is therefore the largest contributor to the knowledge of amnesia, and if we could make a complete and particular study of it, we should acquire the clearest notions of the mechanism in which amnesia arises in relation to the functional localizations of the brain. In the first part of this work I have already summed up our ideas about the group of syndromes comprised under the name of aphasia.

If the matter be thoroughly considered, all cases of aphasia may finally be reduced to amnesia. The only question is to determine whether the amnesia consists in the impossibility to recognise, to reproduce, or to evoke, and in this last case whether it is voluntary, or associative and involuntary.

I do not wish to return here to the vexed question already touched upon several times in the course of this work, whether those centres which we call sensory centres are or are not centres of formation and conservation of images; but it is important to remember that word images are nothing else than images of greater complexity, for the reason that the elementary components entering into their formation are more numerous. It is more than probable that they

* See a similar observation that I made in *Emiplegia*, 1886, reproduced in my volume on the *Malattie del cervello*, which is included in the *Patologia Speciale Medica* of Cantani and Maragliano.

are formed and conserved in those cortical regions that everyone now recognises as the zone of language, in accordance with a postero-anterior evolutionary process of the cerebral mantle that I have mentioned in the first part of this work (p. 160). There is nothing to prove the contrary.

If, therefore, we consider, among other things, the incapacity to evoke a verbal image voluntarily, when there is an interruption of the paths between the field of intellect and the sensory centre of words, and the possibility of evoking the word (even when it is not understood) if another person pronounce it, thus utilizing the paths FF' A'A of the scheme on p. 140, we shall find in this simple fact the clearest proof that the image is conserved where it is formed, and may be evoked at the seat of its formation by an external stimulus, provided the subcortical centripetal paths are uninjured and the external nervous wave reaches its cortical centre ; whilst it cannot be evoked from another cerebral area if the corresponding transcortical paths are interrupted.

Following out what we have said about the functions of the cerebral cortex, we can also continue here the hypothesis that all lesions of the cortical centres of language give rise to amnesia of reproduction, and this amnesia will be complete or incomplete according as the lesion or the inhibition is extensive or circumscribed within the limits of the zone of language. In these cases neither the word spoken by others nor the word seen can be reproduced, and spontaneous thought and voluntary conation cannot be translated into words, while the objects of the external world likewise are unable to evoke their respective verbal symbols. Here we must bear in mind all those differences between the various parts of the zone of language to which I have called the reader's attention in the first part of this work (p. 139, etc.).

Amnesia of evocation comprises two groups referable to intellectual and volitional evocation, and to sensory and involuntary evocation. In the first case, the intellectual field does not do its work. There is defect of synthesis and of directive power, and in such conditions there is no formation of nervous waves suitable for transmission over determined paths to definite points of the zone of language for the purpose of reproducing correlative verbal images ; or the paths of communication between the field of intellect and the sensory centres of language are interrupted, and in that case, evocation is reduced to a vague feeling of knowledge and to an inefficient evocative effort.

Amnesia of sensory and involuntary evocation corresponds in most cases to the so-called associative aphasia of Pitres and others. It may be reduced to this fundamental concept, that the image of the object which, independently of all voluntary and directive power, was previously associated with the image of the word, does not reach the verbal centre owing to the interruption of the normal

paths of association, and the word cannot therefore be reproduced either for internal repetition or for articulation. To put it otherwise, there will arise a sort of involuntary or automatic amnesia of evocation, which is very different from that voluntary form that we have just been speaking of.

If, then, the elementary images that ought to concur from their respective centres to form concrete images (which images give us the true notion of the object and therefore the proper words) cannot come together in the ideative synthesis because the associative paths are interrupted here and there, we have another variety of disorder of memory, which also belongs to the group of *associative amnesias*.

Such defects of memory may have various origins, or they may even be provoked by hypnotic suggestions, or by auto-suggestion in hysterical subjects. Just as the hypnotized person may be made to forget an event, a scene, or a word, so in hysterical subjects certain centres lose the capacity to furnish the product that would be given if their functions were properly fulfilled. Along with the anæsthesia found in hysterics, due to diminished dynamogenesis, there is a great torpor of the whole mnesic process. In some of these cases the amnesia is limited to a few names, or to some figures, as in the case of Ferrari. Paralysis, anæsthesia, hysteric amaurosis are only partial amnesias—tombs of living beings that the skilful medical man can often lay open by his talent.

After what has been said in the first part of this work and in the beginning of this chapter, it is not necessary to indicate here the anatomical substratum of memory. All the perceptive zones are centres of formation and conservation of their respective products, in the same way as the centres of psychic synthesis are the seats of formation and conservation of the particular products of their activity.

CHAPTER IV

PHYSIO-PATHOLOGY OF IDEATION

ON several occasions in the preceding chapters I have recorded a fact that is of capital importance for the study of thought—the creative power of the human intellect. Nature gives us only the raw material, out of which the intellect constructs modest phantoms of imagination or the marvellous and immortal creations of genius, in the same way as, with other raw material, man constructs the hut of the savage, the cottage of the poor labourer, or the sumptuous palaces of the rich; the small hamlet or the magnificent metropolis, where men, like thoughts, live, associate together, oppose one another, separate, act or remain inactive, grow up, and die.

With the continual increase of sensations received and of percepts, thought is evolved in a process of uninterrupted formation and of perennial exchange, through which our notions and judgments assume diverse forms, and the several thoughts, variously nourished and coloured, succeed one another in the most different combinations, with a tendency to manifest themselves, to reflect themselves, and to follow one another in the most widely different conditions of time, place, and manner. There we have the true characteristic of human thought. There is no static element in an awakened consciousness; everything is in motion there. Whatever image crosses its threshold drives out some other one, and may become the evocative centre of attraction of others, as the star that drags behind it a large number of minor stars, forming with the first a true constellation, rises, passes its zenith, and sets, closely followed by others. It is easy to demonstrate that some satellites of the first star return as satellites of a second and of yet a third, and the satellite of one constellation becomes the centre of new formations or of a new constellation, in which the larger star of the preceding constellation will find itself a satellite in a different combination.

We cannot conceive of the intellect in a static condition beyond a relatively small interval of time, as it is not possible that the

molecular movement should halt for a single instant in the living organism. Dynamism is the condition of mental life as of organic life. The slowing down of the continual motion in consciousness and in the unconscious is decline towards death, and is therefore a morbid fact. While constellations are being formed and organized, the components of one pass into another, and then into another, the number of combinations being greater the simpler they are.

It is well to give an example :

In the representation of *paper* we find some components, such as the white colour, the tacto-muscular images of thinness, flexibility, and smoothness, which we meet again as components of very many other images. It is their particular combination that characterizes the specific quality of a concrete image.

In the fact that the simple images enter as components into a great number of concrete images, and that their combinations may be multiplied infinitely, we find the law of evolution supreme. Every hour, every day, gives a very great number of new products, which enter into combination with those preceding them, and increase the thought and, with the thoughts, the personality. As new instruments added to an orchestra always render the music more harmonious, with a more complex harmony, and increase its power of æsthetic action on the mind, giving greater delicacy to the emotional passages, and rendering the fused notes less easy of analysis, so the new percepts, combining with those already formed, always give greater consistency in the mind to that Nature of which the mind is a reflection, and to the laws of its own existence.

The increase of psychic products is continuous and perennial, and results from the action of the agencies of Nature on the perceptive centres ; and the increment of the psychic personality is likewise continuous and perennial, the clearer being the differentiation of the *ego* from surrounding Nature, the more fully the latter is known ; or, what is really the same thing, the greater the number of the perceptions and the more active the process of assimilation and fusion of these, for the formation of more complex psychic products, which synthesize our notion of the psychical and social environment. In this process we may recognise the spiritualization of Nature and the formation of the consciousness from matter. Two orders of psychic products are formed with the percepts—the *aggregated* and the *composite*. The first may be decomposed into their elements, which are associated with one another in the most diverse manner, giving rise to the most varied representations in consciousness.

Although the second may be subjected to the process of analysis, as performed, for example, by the psychologist when he examines them, they are stable compositions, and represent determined external facts or definite relations, being associated in the most diverse manner with one another and with the aggregates, in the

perennial motion of conscious and unconscious thought, in the same individual and in the different individuals of the community.

All concrete images and words are stable composites in so far as they express determined objects and fixed relations. The concrete image of book results from a certain number of more elementary images that have undergone a process of fusion. The frontispiece, the pages, a certain quantity of sheets of paper, the degree of thinness and of smoothness, their numbers, the size and colour of the letters, their form, the line spacing, the particular noise made by the leaves when turning, are so many of these simpler and particular images fused together to give as a result a more complex image. This latter image is a composite, of which the components are indissociable from the concrete image of book. Books differ in size, in quality and colour of paper, in binding, in shape and size of letters, in colour and gilding of the back, in the languages in which they are written, in the various subject-matters, and in ever so many other particulars, of which the respective images have been fused in such a way as to give an indecomposable ideative composite, which is the general idea of book, and which differs from the concrete image of book. The latter is referable to each book that I have seen or that has passed through my hands, as when I seek in my library a certain volume that I once turned over, and in which I read something that has remained well impressed on my memory. The general image results from the visual image of a great number of books, from the visual images of their separate parts, from the tactile and tacto-muscular images (size, weight) of the volumes that have passed through my hands, from the auditory images received when turning them over, from the names of the authors, from the particulars of their contents fixed in my memory, which in their turn are visual, auditory, and kinæsthetic images of words, and lastly from their conceptions. All this is fused into the general image of book. Each book has general characters and differential characters. The latter belong to the concrete images as integral parts, and through them each concrete image is distinguished from all others. The general and the particular characters are all fused in the general idea of book, which represents a very comprehensive product, analogous, if we may take an example from chemistry, to a product of very complex atomic constitution, formed by organic molecules, which in their turn are of complex atomic constitution.

The general idea is not referable to any single concrete image, but to the aggregate of all those images that compose it, and that are synthetized in the word in which the general idea takes its form. All the concrete images from which this word results remain on the first plane of consciousness in larger or smaller number, and we have the representation mainly of those that the memory brings up with the best definition and colouring, these features being given by the strongest impressions and those that have assumed the

greatest number of associative relations. Concrete images, like general ideas, have an assimilative power, strong in proportion to the perceptive and attentive power of the individual. If I take the same book into my hands on several occasions, each time I shall note some feature that had escaped my former observation, and I shall learn something else contained in the book that I did not know before. All these secondary images and notions enter into the concrete image of the single volume in such fashion that, when I reproduce the image of a given book, I can represent to myself a host of other images and of recollections referable exclusively to that of the particular book, the number of these varying more or less with each concrete image. All these secondary images are non-essential to the constitution of the concrete image of the book, but they are secondary parts, attending in various numbers on each concrete image. It is evident that the concrete image that the illiterate man, or the man of little culture, has of a book is very different from that the student has of each volume in his library. Every image has an assimilative power, in virtue of which it integrates itself with assimilable elements of the external world.

The general idea possesses an equal assimilative power. Each new book that is seen or read furnishes new concrete images that fuse with all the others into a synthetic product, which is the general idea of book. This general idea is incremented by the new images and becomes more complex. Such fusion cannot be realized except by the aid of the word. The word alone possesses the resuming property ; it alone is the cold receiver into which fall, like distilled drops, the new images that are to combine with those preceding ; and new images are always coming as long as life lasts, and in proportion to the apprehensive power of the personality. The word alone, that little and inextensible organism, comprehends them all and expresses them in one. In this way are formed our concepts, which are inseparable from names. Conceptualism and nominalism are two correlative and co-existing terms for two facts that are indivisible, just as life and organism are indivisible. Life may cease and the organism, or rather the mummy of it, may remain, as sometimes the content of the concept disappears, leaving the word, which is its corpse ; or the form may be moulded by a man of inferior power, without life and without content, like the pasteboard doll that a child shapes.

Images, however, not having immediate relations with time, transport us beyond the bounds of our immediate environment. This excursion into consciousness, beyond our immediate and direct perception, immensely facilitates extension in the relations of time and space ; and when objects have thus reached the luminous point in consciousness they become nuclei for the formation of concepts, serving as a centre of attraction and assimilation of other images. According to H. Abit (International Congress of Psy-

chology, 1900), the mind commences with a manner of thought that is neither general nor particular, but generic. The perception that reflects the individual and the conception that reflects the genus are two formulæ, like two branches that start in parallel directions from the same trunk. The percept does not precede the concept, but is contemporary with it.*

The concrete images that enter into the composition of concepts are duplicates. These duplicates in concepts have no proper life of their own, but are maintained in activity by the centre of their formation. If this centre is destroyed they lose their vitality and die like the originals, and the concept loses one category of its components, and is atrophied. In the same way as the concrete images of separate objects are maintained active by the elementary images from which they result (see Part I.), the more complex mental products are maintained active by the latent life of all the concrete images by which they have been formed.

When the number and the vitality of these diminishes, or when they die, the number, comprehensiveness and extension of the concepts diminish, or these concepts lose their active qualities and pass away. The clinique furnishes numerous examples in confirmation of this, of which I cite one. A blind man (amblyopic) was received into my clinique, suffering from dementia. He showed no somatic disorder, but was somewhat deranged and very much impoverished mentally, so much so that he would reply only to some questions, and then after considerable pauses. He took no initiative when he perceived that there were persons around his bed, but listened and understood what was said to him, preserving all the movements and all the manners of sensibility. At the autopsy the sole cause of the dementia was found to be extensive foci of softening in both the occipital lobes. All the rest of the brain was normal. In this case the whole rich patrimony of visual images had been suppressed, and, therefore, the frontal lobes, and other parts of the mantle did not become charged with the tensions necessary for the representation of their proper products, the activity of these parts being conditioned precisely by the continual influx of specific waves from all the active parts of the cerebral mantle.

Every nascent thought is supported by the whole retinue with which it has associative relations. It is like the speaker of a party whose thought is supported by that of all the associates whom he represents.

The duplicates of each image that enter into the constitution

* This conception of Abit is undemonstrable. If to-day man can no longer represent sensations, that is due to the complex constitution of his nervous system; but it is evident, if we follow the phylogenesis of the mind, that the process of fusion could not have been realized without the further development of the nervous system. The concept of progressiveness that has been elaborated in the chapter on perception is applicable also to thought.

of concepts have no self-existence. They live with the waves continually transmitted from the respective perceptive centres—that is to say, from the original images that are conserved in them. The whole history of destructive foci of the sensory centres, of the zones of evolution (language), and of the associative paths, is an extended and irrefragable demonstration of this law, which animates and governs the whole complicated mechanism of the intellect. If one centre is destroyed, or one path is intercepted, the activity of the others diminishes, and the whole intellectual life feels the effect; the note of the broken cord is wanting in the preformed harmony of the musical arrangement.

In the continual movement of images there prevails the character of those that predominate greatly over the others in number and in vivacity of representation. Thus, in the motion and explication of thought, men appear rather strongly visual if visual images prevail over others, or they may be rather more aural or more tacto-motor. According to the development of the mind thought will be more sensory when there is a prevalence of concrete images, and more conceptual when there is a prevalence in number and representative power of concepts.

A child of eight years, who reproduces a drawing or a figure very perfectly on a pavement, must possess in a high degree the power of forming lucid visual images and precise associations between visual and tacto-motor images, whence he derives the measure and precision of movement, just as the artist I have already mentioned possessed great ability in drawing the exact outlines of any figure, running from some distance towards his canvas, and drawing rapid strokes with marvellous precision. This was the case with Raphael and with Horace Vernet, who drew from his infancy, 'just as a professor of *belles-lettres* knows how to write;' and there are very many other examples.

The type may be prevalently tacto-motor, as with Konnewka, mentioned by Hirt, who could cut designs in paper under the table, making profiles of the most exact resemblance without ever looking at them, or as with a great violinist who has a very true measure of the actual space on the finger-board of the violin, a singer who measures the vocal spaces with the force of his innervation, or an orator who possesses the precise measure and the faithful motor memory required for the exact articulation of each word and for that sympathetic inflection of voice of which only the greatest orators are masters.

It is quite clear that in these cases there is never only one single form of memory at work. The motor memory of the singer, the visual memory of the painter, the auditory memory of the musician, is always associated with memory of another sense. Visual and aural subjects must of necessity be also motor, because it is only from the strong and faithful motor memory that there can arise

the precision of all the movements with which the imaginative patrimony of the various categories of men is expressed, and the motor memory of the orator is one of the mnestic forms co-ordinated with the immense formative, evocative, and reproductive labour of his mind.

If it be the case that some writers support their thought by the prevalence of auditory images, so that as we read them we must note the rhythm and harmony of the phrase; and if in others visual images prevail, and we are at once aware of the colours and their nuances arranged in their most harmonious groupings, yet in every case the product is complex—the images are fused and difficultly separable. So when we classify men into visual, auditory, or tacto-motor, we intend to draw attention to the prevalence of one order of images over the others, of that order which holds the field of consciousness with most certainty and in the strongest prevalence, and gives its own imprint to the larger manifestations of thought.

The history of art teaches us that artists, visual-motor or auditory-motor, are more sensory than conceptual, just as youth is more sensory than mature age, and the childhood of the race more so than the succeeding generations who have advanced in thought and in action. Conceptualism predominates in maturity and in a very advanced civilization, but art, which precedes science and history, transforms itself later into historic and conceptual art, drawing its life from advanced thought.

Here the law of evolution appears supreme law of thought and word, of content and form. The development of speech indicates the grand trajectory that is described by the thought of man, who distinguishes himself from all the other animal species by his comprehension of his environment and of the whole of nature.

In the same way as, in the development of animal species and of the single individual of each species, the cells, in order to meet the different conditions of existence, assume various forms and employ their intrinsic energy in various functions, in harmony with the functions of other groups of cells, thanks to a continuous process of differentiation, of distinction, of division of labour and of association, according to the successive evolution of the animal series and of the individual in each variety, so in human language we find a continuous enrichment by new materials, due to the development of thought and to the continuous differentiation and distinction of objects, of qualities, of states, and of relations. In the same way as, in the embryogenic development of the human organism, some elementary transitional forms disappear, making way for elements more stable and more fully adapted to life in the struggle with external agents, so the dead languages and the languages that will die, being insufficient to fulfil the purpose of their existence in the new conditions of intellectual life that come with the revolutions of society,

pass away like the transitional tissues ; and, like those tissues, they never return to life, but lend their elements to the growth of the languages that succeed them.

Of the genealogy of, and the immense development attained and to be attained by, speech in the succession of ages, we find the embryology in philology and linguistics. On the same analogy, the study of the development of language in the infant offers a faint reflection (although the conditions are very different, owing to heredity) of the development of human language ; and on the other hand, anatomy, physiology, and the pathology of the nervous system have brought to light a very great number of facts which harmonize the evolutionary law of language with that of the organs of which language is a functional manifestation—mainly the cerebral mantle (see Part I.).

That language is derived from a small number of sounds more or less articulate and distinct is, one might say, proved by the documents we have, dating back to a sufficiently early period of human development.

The radical monosyllables, on which affixes, infixes, and prefixes have made such numerous modifications, enriching our vocabulary by an extraordinary number of words, are much later than other sounds. They, or their derivatives, did not begin to signify precise objects until very late, and the abstract sense that Max Müller attributed to them they acquired only by passing through the verbal form. Thus, *sarse*, which was the name of the serpent, before it signified *strisciare*—to glide—was probably a concrete name, and had its origin in the imitation of the hissing of the serpent, or of the noise that it produces when gliding over the grass.

To-day no one contests the doctrine of the slow evolution and prodigious antiquity of man, the infinitely slow evolution of language and of the human intelligence.

Who can say what was the verbal equipment of man in the palæolithic period, which extends from 240,000, or, at least, from 160,000 down to 60,000 years ago, or what it was in the mesolithic epoch, or what was the equipment of man in the neolithic age, which commenced 20,000 years ago ? (Woodruff, 'An Anthropological Study of the Small Brain of the Civilized Man and its Evolution,' *Amer. Journ. of Insan.*, 1901).

It is known that the cuneiform inscriptions of Persia contain not more than 379 words.

The learned men of ancient Egypt, as far as we can ascertain from the hieroglyphics, appear to have had at their disposal not more than 658 words (Max Müller).

The radicals—and that is as much as to say the linguistic patrimony of primitive peoples—number no more than 400 to 500.

In a more recent publication (the *Monist*, 1891) the same author insists on the statement that radicals are about 800 in number,

but as many of these have the same meaning, and might be omitted from the calculation of roots with special meanings, the number could be reduced as low as 121. That small number of roots has increased in arithmetical progression.

The Old Testament contains 5,642 words, and Shakespeare's plays not fewer than 15,000; Robertson and Webster's Dictionary contains 43,566 words, while the recent editions of Webster have 70,000, and Fluegel's Dictionary 94,464 (Max Müller, 'Lectures on the Science of Languages,' p. 268 *et seq.*). The number of English root-words is about 461, while the sum total of English words has reached about 250,000 (Max Müller, the *Monist*, 1891).

It is sufficient to follow the development of one root to acquire an idea of the marvellous way in which the magnificent tree of language has increased in new branches.

Take the root *spac*, of very vague, general, and involved signification, and we see that it has given :

Spas (Sanskrit), to see, examine.

Spek (Greek) became *skep* by a common literal transposition.

Specio (Latin).

Spehom (Old German), to see.

The Sanscrit *spas* has given :

Spas, guardian.

Spashta, manifest.

Spasa, spy.

From the Greek *skep* are derived :

Skeptomai, I observe.

Skepticos, inquirer.

Skopos, a thing sought.

Episkopos, examiner.

From the Latin *specio* we have the noun *species*—what is seen. The last word was adopted first for movable, useful objects, then for aromas, which were considered as things useful to life, whence the French *espèce* and its derivatives *épices*, *épicier*, and the Italian *spezie*, *speziale*, *spezieria*, and so on.

From the Greek *episkopos* is derived the Latin *episcopus*.

This word, passing through the barbarous language of the Franks, and as a result of a syllabic contraction due to selection, economy of effort, etc., became in French *épisc*. The change of *p* into *v* is frequent in the words that pass into French from Latin—for example, *recipere*, *recevoir*; *sapere*, *savoir*, etc. In this way *épisc* became *evisc*. As a consequence of the frequent change of *i* into *e* among the lower people at Rome, the word becomes *eves* or *evesque* in French, where it further suffers the loss of the *s* and takes the form *évêque* (bishop).

One other ramification (and here I mention only the main stems).

From the Sanscrit *spasa*, spy, there are derived :

The Old German *speha*, spy ;
 The English *spy* ;
 The French *espie*, spy ;
 The French *espion*, spy.

As man recognises new objects and new qualities, new facts, new states, and new relations, owing to the evolution of the perceptive faculty and the power of attention, he has to find expression for all these. His ideas are continually being increased with new words derived from the old ones, in the very same way as the new ideas are derived from the old.

The growth of arts and sciences, the increase of intercourse between distant peoples, literary genius, brevity and euphony (the cause of selection), and syllabic corruption (M. Müller), have sometimes modified words so far as to make them lose all trace of their origin, especially in the labyrinth of the dialects ; nevertheless we can trace the general law.

With our knowledge of the development of language in infants and from the analogy between the laws governing this and the development of the language of early humanity (Darwin, Vierordt, Preyer, Kussmaul, Taine, Schultz, Tracy, and Paola Lombroso), we shall be convinced that the first elements, like the germs of future language in the new-born infant, are indistinct sounds approximating more or less to the sounds of *a* and *e*, the former expressing pleasurable sensations, the latter disagreeable, although these are more or less indistinct.

Vocalization is the expression of emotion, of indistinct sensation, not of the idea. The vocal mechanism is the first to develop in the infant. In the emission of the various sounds, *a* is simpler than *e*, which calls forth the first movements of the tongue, these not being required to emit the sound *a*.

The first labial sounds of *m* and *b*, in combination with vowels in the form of syllables, are quite without symbolic signification, or they are the expression of the imitative faculty, and in satisfying that faculty the infant derives pleasure from the tactile effect as well as from the acoustic—for instance, in the syllables *mam*, *amm*, *nl*, *ml*, etc.

The distinction between the *ego* and the external world becomes traceable at the end of the first year, when the infant emits its first articulate sounds. Even at two years, *I* and *you* are not distinguished and localized. The infant daughter of Ferri said *io* (I) for the first time at twenty-six months, and Preyer's infant son did not properly distinguish *I* from *you* at thirty-one months. The intel-

lectual and cerebral development of the infant does not admit of polysyllables, but only of monosyllables, or of a syllabic combination less complicated than the real word that the infant intends to pronounce. It has already the image of the object and the acoustic image of the word, but not the motor co-ordination required to express it. A very intelligent infant girl said *ooo* and afterwards *nooo* for *sonno* (sleep) whenever she wanted to go to bed. Instead of *acqua* (water), infants say *aa*. Sometimes they pronounce only two syllables for a word of three or four. One of my children used to pronounce *pova* instead of *portogallo*, and infants mentioned by Taine used to say *colà* for *chocolat*.

What we learn from the examination of the documents of the first language of men, the primitive language of roots, is its real likeness to the language of infants, which has, among other peculiarities, its onomatopœia and its elementary syllabic structure; for the infant always uses a smaller number of sounds, saying *ban* instead of *blanc*, *omama* instead of *grossmamma* (Schultz).

There is a want of precision in each particular sound, so that *a* becomes *ai*, *au*, *iau*, etc., while the consonants are often softened, *b* being said for *p*, soft *s* for *c*, *s* for *z*, *th* for *v*, etc. Some sounds are put for others, as *tloix* for *croix* (Sikorsky).

When infants have become able to pronounce sounds separately they are still incapable of co-ordinating these to make a word of them. They may pronounce quite well *ca-mi-na* separately, but some time is still required before they can put these syllables together to make *camminare*; they say either *nannà* or *mina*.

All these peculiarities of infantile language confirm the doctrine of Taine that, in the infant, sounds are elaborated by a constant metamorphosis of the simplest elementary articulatory movements.*

Much more significant is the fact that the words pronounced by the infant, generally neologisms or onomatopœic formations, serve to indicate a number of objects and of relations. Preyer's infant meant to express by the word *atta*, I wish to go, it is gone, it is not there, it is no longer there, there is nothing there, there is nobody

* Taine and Schultz have given a physiological interpretation of the metamorphosis of the various articulate sounds made by infants. From their observations they have deduced the law that there is progression from the simpler movement to the more complex, and articulatory motions are first realized through those organs in which the tactile sense is most developed. It is for this reason that infants first pronounce the labials and the dentals *m*, *b*, *p*, *t*, *s*, and do not pronounce *k*, or the Italian *ch* and *j* until quite late. In the first place, this last letter requires a greater expenditure of muscular effort (Schultz); in the second place, it requires a much more complex co-ordination of movements than the infant is capable of; finally the infant employs the exquisite tactile as well as the muscular sensibility of the lips and tongue in pronouncing the labials and dentals, while to pronounce the palatals, as the skin and the vault of the palate have little tactile sensibility, the different palatal position of the tongue can be guided by the muscular sensibility alone.

there, it is empty, etc. These appear to be the *word-medals* of P. Lombroso.

It is probable that the monosyllables and the onomatopoeic neologisms of infants are the correlatives of the roots of a very remote epoch in the history of humanity. The predominance of vowels in the language of infants has its counterpart in the predominance of vowels in many primitive languages. It is very probable that the man of the palæolithic age, and even of the neolithic age, had no other language than that of gestures and simple vowel-sounds or interjections associated with some consonant, just as is the case with certain animals. Later on there were formed monosyllables, and for a long time these had various meanings, dependent perhaps on their arrangement in the phrase. As Curtius has proved for Greek, and Schleicher, Grimm, Schlegel, D'Ascoli, Müller, and others for Sanscrit and the other tongues, all these languages have passed through a period of roots, which generally expressed empirical sensory impressions. Even to-day, in Africa and in Asia, we find rudimentary languages, monosyllabic and comparable to the chattering of birds (Müller). The Vedas of Ceylon have a language composed chiefly of guttural sounds, in which it is difficult to perceive any true articulations (Emerson, Tennent).

Hahn and Bradley came to the same conclusion about the language of some Hottentots and that of an Australian tribe, finding in these nothing but monosyllabic cries. In the language of Hawaii, for example, we find *huiaioni*, to testify. It is supposed, and much evidence supports the hypothesis, that as words progressed, some slight articulations became stronger, and that the less the total number of consonants, the older and less fully evolved is the language. As with the development of the language of the infant, so, in certain peoples, indistinct sounds would become distinct sounds as these passed from generation to generation. In all the dialects of Polynesia, according to Hale, we find no distinction made between the sounds *b* and *p*, *d* and *t*, *g* and *k*, *l* and *r*. The Sanscrit word *gharma* (heat) becomes *thermos* in Greek, the aspirated guttural of the first having turned into the aspirated dental of the second, for the very plausible reason, advanced by Max Müller, that the phonetic diversity is to be attributed to a previous state of the language in which the two or three main points of contact were not yet definitely separated one from another, as happens in the Polynesian dialects and in the speech of the infant.

When the infant has learned to pronounce words properly, his stock of words, like his stock of ideas, is very poor, and these few words have very general meanings. For example, for a certain time he applies the word *papa* to all the men he sees, because he does not yet know the difference between his father and other men. This was probably the case with the roots when they were words of a living language, and it is so to-day also with certain peoples

whose intelligence and culture have still remained at a very low stage.

The large modern stock of words has been acquired, as it is acquired by the infant, through a continuous process of differentiation, and therefore by the accumulation and the harmonic arrangement of new ideas and new concepts derived from the first. The difference is that in the infant of to-day all the organic conditions indispensable to intelligence and to modern language are performed by atavism, whilst in the very long prehistoric life of humanity those conditions had to come about through a slow evolution, determined by stimuli from the external world in the broadest sense of the word.

The knowledge that we have of the evolution of the sense of colour may serve for all the other senses, although our evidence as regards the latter is much restricted.

We cannot put ourselves in a position to consider the psychic condition of primitive peoples, just as we are unable to penetrate thoroughly the psychic condition of infants, because we feel, perceive, and judge quite differently from the infant; in the same way we cannot feel the harmonies of a concert or the beauties of a painting as an artist perceives them. As a matter of fact, green, blue, sky-blue, violet, were all included in, and confused with, black. Etymologically, *blue* and the German *blau* are derived from *black*. The Chinese *hiuan*, which to-day means sky-blue, originally meant *black*, and the word *nil*, which now signifies *blue* in Persian, is derived from the Nile or Black River (Bucke, 'The Growth of the Intellect,' *American Journal of Insanity*, July, 1882).

It appears, therefore, that language has had a development parallel with that of the human senses and intellect, from its first stage of more or less emotive vowel-sounds. The mechanism of articulation developed later. In the monosyllables we have, as in the germ, the first elements of the future articulated language. Languages have been constantly enriched by new words, and they have thrown off the old elements of expression that are no longer adapted to perfected modes of impression and to new conditions of existence. Finally, in the development of the language of the infant (ontogenesis) we can trace, reproduced as it were, the process of development of the language of man (phylogenesis).

Language and thought, in my opinion, have grown parallel with one another. They are two aspects of the same fact, and are inseparable, at least in so far as refers to concepts. The Greek word '*logos*' had the double signification of 'word' and 'thought,' and anyone may convince himself that '*Logos*' cannot exist without '*logos*' (Max Müller). From the example cited we may easily argue the distant relationship of the abstract words 'spectacle' or 'respectability' with the root '*spas*,' through the medium of a certain number of infixes and suffixes; and anyone may convince

himself that the words from which they are derived had a concrete meaning resembling the sense in which the word 'scopos' was used. When, by a continuous process of association of concrete images and of relations, we arrive at abstractions such as those expressed by the words 'spectacle' and 'respectability,' the thought that they contain cannot be represented except by these particular words. We can imagine to ourselves a visible object, or several things together, that we have seen and that have moved us, but all these images together are not the abstract concept of 'spectacle.' This concept exists only by the fusion of so many things and so many relations between the visible world and the *ego* in the word 'spectacle.' Though water is formed by the combination of hydrogen with oxygen, it is not, however, the same thing as hydrogen and oxygen; water is water, and it exists only by its own intrinsic qualities, in the same way as the word 'respectability' exists only by its constitution and by its content coalescing with its form. This word can signify nothing concrete, no single respectable person or thing, nothing that falls under our senses, and therefore it cannot awaken the image of any percept, except the phono-articulate symbol.

The word 'matter,' to make use of an example adduced in a recent work of Max Müller, expresses something which is not an object. 'Matter' *per se* does not exist, just as 'spectacle' does not exist, except through the word which synthetizes all the images of an infinity of things comprised in matter.

The pathology of language has furnished the most irrefragable proofs that concept and word are coalescent and inseparable, in the sense that the disappearance of the word destroys the comprehensive power of the content of the concept. If I lose the word 'laboratory' I can represent to myself, one by one, the concrete images of places and of apparatus belonging to a scientific institution, of persons and of investigations, but I have no longer the synthesis of the whole. This idea was clearly expressed by myself many years ago (1887), though not then new, and it coincides with the conclusions reached by Heinrich Gomperz in an interesting pamphlet (*Zur Psychologie der Logischen Grundthatsachen*, Leipzig and Vienna, 1897). If we could suppose a man of perfect understanding deprived of speech, we might imagine, according to this author, that he would be capable of perception and of reproduction, of attention to resemblances and differences of things, of analysis of complex images, resolving them into more simple ones, and of that form of thought which we call imaginative; but he would be incapable of the fusion of ideas into general ideas, and he would be unable to form propositions or chains of reasoning.

In the evolution of thought, therefore, the formation of general ideas by synthesis is conditional upon the formation of the word, with this difference—that whilst in primitive speech, as in the speech

of the infant, every word designates objects that might be confused, in languages that have undergone an evolution the abstract or general terms designate a number of particular objects that have some features in common, or certain relations with each other, being what Gomperz calls 'sensible correlatives of the idea.'

The states of profound dementia consequent on the formation of a small destructive focus in the first temporal convolution on the left side, or even only in the angular gyrus in visual subjects, inducing verbal amnesia (Bianchi, '*Rivista sperimentale di freniatria*,' 1887, and '*Dottrina dell' afasia rispetto alla intelligenza ed alla capacita giuridica*'—*Il Policlinico*, 1894), offer an experimental solution of the vexed question—discussed with varying fortunes by Locke, Spencer, Romanes, and Max Müller—whether language is absolutely necessary to the formation and manifestation of the intelligence.

In the course of abstract thought, however, it may be stated that some particular individuals (concrete images) are recalled as sensible representatives of the whole group, for if I speak of cavalry I should have the representation of some soldier or officer on horseback, or of some scene that has passed before me; or new associations of a superior order will be formed between the abstract and general terms, permitting of a succession of words without any representation of sensible images denoted by those words. In this high form, thought resembles an operation of algebra. Such a form of thought is most frequently solitary, whilst in our communications with others sensible images always intervene, and the more so that in these communications, especially if they are descriptive, the speaker always proceeds to the analysis of complex images.

From what has been said it is easy to argue that the whole mental structure rests upon the law of association. Aggregations and combinations (the fusions of Wundt) are not possible except through the associative power of all the psychic formations, from the most simple to the most complex, and through the anatomical substratum which supplies the organic and mechanical conditions necessary to psychic action, as we have hitherto been considering it.

Association consists in the connection that is established between ideas, emotions (Scripture), and movements. These connections exist amongst the whole patrimony of images corresponding to objects external to ourselves (James) and amongst all the forms of reaction of the *ego*.

Two forms of association are generally known: association through resemblance, and association through contiguity, or, according to Wundt, intrinsic association and extrinsic association. Intrinsic association corresponds to that founded on resemblance, extrinsic to that dependent on contiguity. If the physiognomy of one person resembles that of another person whom I know, so that

a chance meeting with the first at once calls up the image of the second, in such a case the bonds of association are close, some elements of the two personalities coincide, and the association is intrinsic.

If, on the other hand, when I meet a person whom I have seen on a former occasion in some other place, I have a representation also of the locality or the image of another person who chanced to be in that locality, such an association between person and place, or between two unlike persons and the place where they were at the same time, and consequently between the respective images, is extrinsic, because here we have to deal only with a coincidence which does not touch the nature or the form of the objects.

Associations are also divided by certain psychologists (Wundt, Kraepelin, Aschaffenburg) into two great classes: immediate and mediate associations. The latter are produced through the medium of a common term without this term itself appearing in consciousness. Language offers a good field for experiment. Immediate associations are further divided into two groups, according as the word pronounced is understood, or has evoked an association in its quality of a simple sound. When the word is understood, we have co-ordinated and subordinated associations, as, for example, when the word *statute* calls up the word *law*, *asylum* suggests *madness*, *nightingale* suggests *bird*; or the relation of the associated words is predicative, as in *ripe fruit*, *black ink*; or is casual, as in *merit*, *decoration*, *alcohol*, *inebriety*. These are *internal associations*. *External or extrinsic associations* are due to co-existence in space and time, or to identity of sound.

Examples of association through co-existence are: *mouth* and *nose*; *pen* and *paper*; *ink-bottle* and *desk*. Synonyms and words translated into another language originate external associations, but these might be due also to identity. Then there are associations due to verbal reminiscences, like the words that always come together in a proverb or a common saying.

When the word is not understood it acts only as a sound, and its effect depends very much on the termination of the word. In such a case the association is due to sound and rhyme, with or without sense. If the word is simply repeated there is only a motor association of reaction.

Bourdon distinguishes four forms of verbal associations:

1. Phonetic associations without significance, and due to resemblance.
2. Grammatical associations of nouns and nouns, nouns and adjectives, nouns and verbs, etc.
3. Associations due to the signification, without representation of concrete images.
4. Associations with representation.

External associations are more frequent than internal (Aschaffenburg).

burg); they are also more rapid. Associations of nouns are much more frequent than those of verbs.

We have said that associations are co-ordinative and subordinative; quality is associated with object, object with quality, and so, in another field, letter is associated with letter, word with letter, the name of a colour with a letter, a word with another word, a number with a colour (Calkins).

Here we have one of the reasons of the intellectual differences between men. In some men co-ordinate associations prevail, others associate more frequently and easily through subordination; hence arises in part the variety of syntactical forms of speech. It is the difference of association that impresses a particular character on the intellect; for instance, the intellect of the reasoner differs from that of the descriptive writer, owing to the relative homogeneity of the mind of the reasoner compared with that of the descriptive writer (Bourdon).

Some distinguish associations into persistent and non-persistent, into total and partial (between objects, or between the elements of which the objects are composed). There are associations focalized, due to one sole element. Then there are simultaneous and successive associations, into which the relations of space and time enter as constituent elements. Simultaneous associations present themselves under three forms (Wundt):

1. *Fusion*—that is, the fusion of two connotations or sensations of the object perceived—such as the colour and the perfume of the rose, the colour, or the shape, and the taste of the orange.

2. *Assimilation*, which is a fusion of more complex components.

3. *Complication*, in which there are evoked images referable to different senses, as when the sound of a bell calls up the visible image of it, and the distant associations between certain movements and certain words, such as those that express a definite mode of motion.

A. Anastay relates (Congr. Inter. de Psychol., 1900) that during a journey he was unable to recall the name of a river. At night he went to bed annoyed at such a lapse of memory, and set himself once again to recall the name, but without result. In order to send himself off to sleep, he started to dance vigorously, and all at once the name recurred to him. It was *Ubaye*, or, according to the local pronunciation, *Ubaylle*, and the resemblance of the name to the word *bailler* (to dance) evoked by his dancing established the association.

We have further to note association due to similarity (Bain, Spencer, Hofding, Calkins).

Association is rarely mediate, as is proved by the experiments of Scripture, Howe (*American Journal of Psych.*, 1893-1895), and W. Smith. Münsterberg, again, denies mediate association. In the experiments of Howe, who constructed a series of words with a meaning, and placed after each word a meaningless syllable, we have

examples of mediate association. The subject listens to a first series, then a second series, and then the first series is repeated to him ; if, on hearing a word of the first series, he remembers the word which follows, separated by the meaningless syllable, that is a mediate association. Such associations, according to the experiments of Aschaffenburg, hardly reach the proportion of 4 per cent.

The time and the number of associations vary very much in different individuals. This variety has been proved by many experiments, among which those of Aschaffenburg deserve remembrance (*Experimentelle Studien über Associationen*—*Psychol. Arbeit, I. P.*).

If a word is pronounced to the subject of experiment, and he writes down all the words that it suggests to his mind, to the number of 100, or if he associates with it another word of similar or different significance in the shortest time possible, the time being measured for each experiment, we shall have in a certain way a measure of the verbal associations in a given time.

Among the associations that are meantime much neglected by psychologists are those due to contrast. Associations due to contrast are among the most frequent and most active in the process of thought, and they furnish the most plausible explanations of an infinity of normal and morbid phenomena which would otherwise remain quite obscure. In some intellectual and affective categories, the first and last components of the series are more closely associated than any of the intermediate components.

In the field of sensation, white is more closely connected with black than with the intermediate shades of gray ; the image of the heaviest body is closely associated with that of the lightest body. The representation of smoothness is associated with that of roughness, etc.

In the domain of feelings, pleasure and pain come together, although they are the extremes of a series of gradations of pleasure, gradations of pain, and of different sensations. Friendship supposes enmity, love supposes hatred, fear supposes courage, and so on. As we mount in the scale, the beautiful supposes the ugly, the moral the immoral, the perfect the imperfect, the wholesome the unwholesome, the illiterate the cultured.

Many such contrasts are the negative side of an affirmation. When I judge men good, moral, beautiful, cultured, disciplined, I form equally and simultaneously comparative judgments, and I represent to myself bad, immoral, ugly, uncultured, undisciplined men, whose images are closely associated with those of the others, in such a way that whenever I summon up any of one series, immediately the correlative of the other series corresponds to it.

The law is that associations due to maximum difference are stronger than those due to resemblance or minimum difference.

Contrasts establish themselves, from the first appearance of

mental associations, side by side with associations due to resemblance and to contiguity. When an infant stretches out his little hand towards a burning light and feels the pain of the burn, he notes and remembers the contrast between the pleasing aspect of the bright light and the pain that results from contact with it. If, in order to wean her child, a mother puts some bitter solution on the nipple, there arises a strong association of contrast between the pleasure of sucking and the repellent bitterness of the nipple. The smile inspired in an infant by the playful attitude of the father becomes associated with the painful expression induced by the father's severe behaviour.

The whole education of infants rests upon the law of psychic contrast. Aspirations, desires, movements that are opposed and hindered, associated as they are with the opposite tendencies of the mind and the relative associated ideas, furnish very numerous examples of association by contrast. Love and hate, confidence and diffidence, hope and fear, are the emotions most frequently alternating in consciousness, being ever in contact, as it were, on its threshold ; and whenever one disappears the other occupies its post. Dumas, unlike many psychologists who either make no mention of psychic contrast or deny it altogether, like Hartley, J. Mill, and Stuart Mill, wrote : ' Man is a very strange animal, wholly made up of contrasts.' After Bain, no one has elucidated the importance of the phenomena of contrast in the succession and association of ideas, emotions, and acts, more fully than Paulham (*L'Association par Contraste*—*Revue Scientifique*) and S. de Sanctis (*I fenomeni di contrasto in Psicologia*, Roma, 1895).

Here also pathology throws a clear light on a fact that is of the greatest importance to psychology in the interpretation of many physiological and pathological phenomena.

The intense love that the neuropathic mother has for her child awakens in her consciousness, in contrast with the joy of possessing, the fear that some illness may carry off the infant ; or it may be that when she leans upon the balcony she fears that she will cast down the object of her love. A little further on we shall see how many other psychic disturbances are to be interpreted solely through associations due to contrast, and how much more frequent than is generally believed are the cases of delirium due to contrast.

As far back as 1886, in a study on psychic polarization (*Archivio di Psichiatria, Scienze Penali e Antr. Crim.*, 1886), I set forth clearly the principle of association through contrast. ' This fundamental logical process,' I then wrote, ' is the resultant of the associative relations of the sensations and of the ideas, especially the relations of antithesis, with which are associated analogous states of pleasure and pain. From the very force of the function of reasoning to a conclusion in the normal process of mental life, it results that every idea bears with it the antithetic idea ; but the attention directing the

latter does not reach the visual field of consciousness, it remains suppressed, but not inactive, in the unconscious. . . .'

I am of opinion that even to-day, after many years, this idea may serve as an explanation. The idea in contrast surprises the consciousness when the attention has been for a long time directed to the other idea. De Sanctis lays down as a condition of contrast the intense, prolonged, and inopportune convergence of the voluntary attention upon an idea. That is true only in some cases, because pathological contrast depends also on the weakening of the directive power of the will corresponding to the increased power of automatism, and the exalted emotional tone of the mind—features that have been present in every case that I have observed.

I agree unreservedly with De Sanctis as to the other factor that he notes as facilitating pathological contrast, viz. : 'The permanent or periodic deficiency, be it partial or general, of cohesion among the elements constituting the aggregate personality and the consequent want of unity, of synthesis, and of power to will or to inhabit. . . .'

The contrasted idea is often the primary one, and is eliminated by its antithesis, which expels it from the purview of active consciousness.

Freud and others have noted that when an individual proposes to himself to do something, ideas, more or less actively in contrast with this, present themselves to his consciousness—the *Gegenwille* of the Germans. The mental phenomena experienced by Socrates, of which we have detailed descriptions, and which were attributed to his 'daimon' (Lelut), are nothing more than phenomena of psychic contrast ; and so also are the motives and counter-motives that dispute with one another, in the field of consciousness, the government of our actions.

It is well known that there are a number of individuals, especially hysterical subjects and neuropathic children, who always act contrary to the order or the recommendation given them. Some of these, when they wish to avoid disturbing bystanders by sneezing or yawning, actually direct their wills to yawning or sneezing (contrast by inhibition).

The anxious fear of committing some act that is dangerous or repugnant to the conscience, drives into the field of consciousness all the images connected with that act ; and those images, especially in degenerates, are endowed with an excito-motor power and an extraordinarily impulsive activity. Therein lies the explanation of the fact that those who are greatly afraid of death, and especially of suicide, end by committing suicide (coercion due to contrast).

Vows of chastity and religious practices often excite intensely erotic ideas and desires. The hysterical erotism that claimed so many victims in the monasteries of the Middle Ages was the contrast of the chastity to which monastic orders and sects vowed themselves (Bianchi, *Il nevrosismo di questa fine di secolo*, 1899). Such a

contrast is depicted in one of the most celebrated paintings of Morelli—'The Temptation of St. Anthony.' Santa Teresa was tormented by libertine and lascivious ideas whenever she thought of chastity (Lemesle).

A little farther on we shall see how many psychopathic phenomena, and above all, how many cases of delirium, depend upon association through contrast. Here, again, we see clearly that we cannot complete our knowledge of the facts of normal psychology, or of the laws regulating healthy mental life, except by the analysis of pathological phenomena.

Associations may undergo a species of interference—an analogy applied, inaptly, in the strictly physical sense of the term, by A. Bergström ('Experiments upon Physiological Memory by Means of Interference of Associations,' *Amer. Jour. of Psychol.*, 1892). Interference of associations, says this author, is a fundamental fact of the nervous system, and consists in this, that once an association is established between two terms A and B, if a new association be sought between A and C, the second is in conflict with the first.

In general, when we wish to exchange a habitual mode of doing a thing for another mode, the old habit resists, and when we are wearied or busied with some other matter the tendency is to revert to the old fashion. The law of interference is just as fundamental as that of habit, which has been so thoroughly treated by James. The reason why we are not inclined to novelty lies in the fact that we are unwilling to make the effort required for new associations. This is referable to another law of life—the law of *least resistance*. Bergström's experiments are directly intended to prove the fact that, notwithstanding every effort, a decided interference takes place when we endeavour to associate a new reaction with an old stimulus, just as when something is learned in a new or different fashion. The confusion, writes Bergström, that we find in the mind of young students when an argument is presented to them under a different form is an illustration from another field. Much of what has been attributed to the failure of memory with age ought to be placed in the category of interferences. In my opinion it ought to be attributed also to the mnemonic capacity of the various individuals.

The factors of association are many, and they cannot all be examined by experimental methods. The experiments, however, of Müller and Lehmann ('*Experimentelle Beiträge zur Untersuchung des Gedächtnisses*'—*Zeitschr. f. Psych. und Physiol. d. Sinn*, VI.) brought to light numerous facts regarding association from the point of view of memory; for example, two syllables of one series separated by one or more syllables; the association between that which follows and that which precedes; the stronger association between the odd syllables than between the even, for

the reason that the former are pronounced with more emphasis than the latter ; the association with the position occupied by the syllable, with the rhythm with which it is enunciated, etc.

Potency of association, which gives us evocative imagination, is not, however, regulated by any of the known laws of association, nor does it always require a clear memory or any considerable wealth of sensible representations to serve all its combinations. In it there come into play the elements of hazard and logical incoherence (Vaschide). According to this acute observer the first dreams of infants, like the fibs told by young children, are phenomena of creative imagination based on the absence of precise perception of the real facts, or upon error of the senses.

Who can say under how many different aspects things may be regarded, and how different are the imaginative judgments of the most similar objects ! If little drops of ink are allowed to fall on pieces of cardboard, and if we press other pieces of cardboard upon these, the ink squeezed out will make spots of various shapes on the said pieces. In such spots one child will see a horse, another child an animal with its mouth open, while another will find there the head of his teacher or of his teacher's wife, all of them noting the strangest resemblances. A housewife, on the other hand, will see in these spots domestic articles, while the artist and the mythologist will see picturesque and fantastic objects. This is not a case of illusion but of associations, due to likeness or analogy of all these objective figures with others that are preformed and very readily reproducible in memory (Dearbon, 'A Study of Imagination,' *Amer. Jour. of Psychol.*, 1901).

Protracted mental work, according to the researches of Aschaffenburg, exercises a notable influence on the associative power and on the forms of association. With fatigue, the number of internal associations diminishes considerably ; while the number of external associations, such as those formed between the sounds of words, increases with the duration of labour, there being special increase in rhymes. Associations arising through co-existence in space and time likewise diminish in number with fatigue.

The researches of Aschaffenburg coincide with those of Binet and Henry on the influence of intellectual fatigue on the memory (A. Binet and V. Henry, *La Fatigue intellectuelle*, Paris, 1898). These researches should prove of great value to pedagogues and to the compilers of schemes of study for schools.

Association between ideas has a bearing on the formation of propositions, which include a judgment or a conclusion on the relation of two or more of these associations.

These associations are either modified reciprocally, as when I say, 'This asylum was a convent'; or they are co-ordinated, as when I say, 'Nuns once lived here where now are madmen'; or

they fuse together, as when I say, 'That distant black spot was a squadron of cavalry.'

According to Brentano and Vailati propositions may be divided into three categories: explicative propositions, observational propositions, and normative propositions. These three categories of propositions correspond to three fundamental forms of judgments, which comprehend, according to these authors, all the constructive and explicative forms of thought. The first correspond to representations, and form analytical judgments (Kant), or judgments determinative of relations; the second express judgments of assent, or of doubt, as opposed to affirmations, the contents of which are supposed already to be known; the third category is composed of propositions, of appreciations, and of judgments of value.

Every proposition contains the elements of conviction in so far as every conclusive judgment tends to affirm or to deny, and so conviction appears as a phenomenon of association of a higher order, and would not be possible but for general ideas.

Reasoning, which is essentially made up of propositions, is nothing else than a more extended and complex association of propositions, the associated components of which possess correlations of time, space, and number, from which arise the grammatical inflections of words and the syntactical forms that are the product of a more advanced mental evolution.

From what has been said, it is clear that in the examination of the intelligence we must keep before us the quantity of the ideas, their complexity, whether simple or fused, their re-evocation, their associations and combinations, the constructive property of the mind, with its ideative content in relation with the percepts or with the thought of the social medium (judgments, beliefs), and the form of language.

The anatomical substratum of thought comprises the whole cerebral mantle. On this point I have said sufficient in Part I. and in the chapters on perception and memory. If we bear in mind that the elementary components of concrete images are required to maintain these latter alive and evocable, just as the presence of these is necessary to evoke all the associated components in the respective perceptive zones, from which, as a whole, we draw the complete notion of objects; if concrete images are necessary for the formation of the products of synthesis or of fusion, wherever we have synthesis, it may be concluded that the whole of the brain assists more or less in the formation, representation, and expression of thought. The sensory areas of the cerebral mantle, in so far as they furnish the images of the external world; the area devoted to synthesis or the fusion of the sensory products into psychic products of higher intellectual value; all the zone of language, in so far

as it furnishes the sensory and kinæsthetic images of speech, in which thought is moulded and formed—all make their specific contributions. These different parts of the mantle are connected and brought into communication with one another by means of associative paths, of which the best known have already been described in the first part of this work.

There we have all that is known with any certainty about the anatomical basis of intelligence on the morphological side. This supposes a normal structure of the nerve-elements, cells and prolongations, and normal relations (not yet decided) between these. The seductive hypothesis of Rabl-Rückard, of a network of fine nerve-fibres (neurospongium) formed of numerous small branches originating in the protoplasmic prolongations, serving as the seat of and as the pathway for the interchange of the elementary and the higher psychic processes, and the other hypothesis formulated by Mathias Duval, Lepine, and others, as to the amœboidism of the cell prolongations, enjoyed only momentary favour. It was certainly very convenient to explain the phenomena of thought, sleep, hysterical paralysis, and hypnotism, by the doctrine of the expansion and contraction of the nerve ramifications; but, as Kölliker observed with regard to the first, and as is proved by the recent researches of Michelina Stefanovska, there is not a single fact in proof of the existence of amœboid movements either of the dendrites or of the terminal ramifications of the neurons. The axis cylinders do not undergo contraction, the more so as they are comparatively solid and organized (fibrillar). On the other hand, it has been impossible to prove any movement of the nerve-endings in the transparent parts of animals observed while alive, as in the case of the larvæ of the batrachians.

Cajal himself, who supposed a variable histological factor to which the infinite varieties of mental work might be referred, has not been able to confirm any part of his theory by objective examination, both axis cylinder and protoplasmic ramifications presenting always the same extension, the same form, and the same appearance. Stefanovska says: 'I have never been able to observe retraction or contraction of the dendrites properly so-called. I have observed only the retraction of the pyriform appendices under the influence of violent blows, under electrification of the brain, and in profound anæsthesia, which is only a particular form of poisoning. In other words, the disappearance of the pyriform appendices is always provoked by abnormal causes' (M. Stefanovska, '*Etude histologique du Cerveau dans le Sommeil provoqué par la Fatigue*,' *Jour. de Neurologie*, 1900).

Amœboidism is also denied by Ziegler and by J. Soury, who stated in the *Revue générale des Sciences*, 1898, that the histological theory of sleep had not only added to the obscurity surrounding the true nature of the cause of this phenomenon, but had created in

many sincere minds the illusion of knowledge, despite the warning of Kölliker. Meanwhile the researches of Apaty have revived the doctrine of the relations of continuity between the nerve prolongations, and the rapidly constructed theory of the neurons and amœboidism is falling to the ground. We shall wait patiently until new and well-ascertained facts give us the means to set our minds at rest, troubled as they are by the darkness still obscuring the question of the anatomical basis of the phenomena of thought.

The anomalies of thought are quantitative and qualitative. Quantitative anomalies include also those of the duration of the passage of thought, in so far as this passage obeys the law of time, like all psychic facts. In this regard there are disorders referable to the unduly long time required for formation and extrinsication, and others attributable to the excessive rapidity of development.

Considered in itself, excessive rapidity is not a disorder of thought or of ideation. It is certainly a disorder with regard to the usual time required for the associative processes in the individual, because, given certain morbid conditions, we have often, along with rapidity of thought, superficiality and other anomalies of the associative mechanism, giving rise to changes in the new ideative series and the logical form of thought itself.

In fact, except in the very first grades of certain forms of maniacal exaltations, in which some exalted persons show themselves possessed of a strong power of observation and of memory, rapidity is not generally a morbid condition in itself unless when it exceeds certain limits in relation to each single individual, and is associated with other anomalies of the formal process of thought, such as deficient, superficial, or extraordinary association of the diverse elements of which thought is constituted.

In mania, in the pre-paralytic stage of some forms of progressive paralysis, in some forms of acute paranoia and acute hallucinatory delirium, and in some cases of hysteria, we find the best examples of morbid rapidity of thought.

Wherever there is diminution of intellectual working and defect of attention, ideogenesis may be accelerated through the association of indirect ideas (Aschaffenburg). Hallucinations also have power to increase the rapidity of the formation of ideas (Ziehen).

We need not repeat here what has already been said when we were speaking of hypermnèsia; we need only add that morbid rapidity of representation is accompanied by modifications of the phenomena of association. These become more frequent with regard to the forms of things and the sounds of words (external associations) than for the substance of things and the meaning of words (internal associations).

A lady who had just emerged from a state of intense maniacal excitement said: 'Now I am much better, but in the past few days—in which I had loosened an exceptional ligament of the

tongue—I have had an extraordinary number of ideas. I did not succeed in expressing them all ; and ideas that I had never had before, or that I had lost for a long time, came to me all at once.’

In such cases there is an extraordinary awakening of recollections and of various ideas that have no strong associative connection with each other. True associations have not time to form, and instead, there is a predominance of motor association, whence the rapid manifestation of thought in words and in acts. Here we are dealing with rapid representations of the movements of words (association through rhyme, phonemata). Often in such cases, all the ideas have not even time to secure expression for themselves, either in language or in gesture. Sometimes the patients are in a condition to make what I might call a selection among the ideas that crowd into the field of consciousness, and to order them so that their speech is logical, although empty of meaning and mingled with proverbs, neologisms, and witticisms. In the more advanced stages, there are seldom wanting other pathological facts that deserve greater consideration : superficiality of judgment of the actual perceptions ; paradoxical connection of ideas, giving rise to strange thoughts that are often brilliant in appearance but comparatively empty ; errors of judgment as to the relations of the subject to his environment—these are the most common phenomena. At other times the cerebral excitability is increased to such a degree that the slightest external or internal stimulus, or the most trifling recollections, are sufficient to awaken a number of others that chase each other through consciousness, and form a nexus with the preceding, though without any regular relation to them. Thought becomes disgregated, assuming the most distant associations, often due solely to the sound of the words ; speech becomes disconnected and almost totally incoherent, owing to the torrent of ideas that rushes over and overwhelms the psycho-motor paths (tumultus sermonis).

On the other hand, thought may be morbidly slow. There are individuals who regularly formulate and express their thoughts with much slowness ; still the slowness remains within physiological limits.

We have sometimes a more or less notable activity of attention, and a strong logical connection between ideas, coinciding with such slowness. But there are cases in which the time required is excessively long, and the thought is developed with great slowness, yet it shows no true formal anomalies in its constitution. The individuals presenting this phenomenon are in various pathological conditions.

It may be that the mind is in pain. Pain is a condition of arrest, which implies a centripetal direction of the nerve-waves towards the consciousness, and therefore greater resistance in their extrinsication. The velocity is in inverse ratio to the resistance,

and so it comes about that where there is most pain, and therefore resistance, there also is the greatest slowness in the course of ideas, extending to complete arrest. Physical and moral pain are the same thing as far as the laws of thought are concerned. The state of intense emotion of the person suffering morally induces a static condition of consciousness, with cumulative action, and a tendency to fix in consciousness some classes of ideas to the exclusion of many others. The same thing occurs when attention is concentrated on a theme, especially if that should possess a strong affective power of a painful or an egoistic nature. In all states of strong emotion in which there is a concentration of tension in consciousness, the thought that is not connected with the object of emotion will not have the initial impulse to send it on its course with the usual velocity, or there will be opened to it very few paths (*e.g.*, flight, or defensive movements made in fear, etc.).

In other cases we have diminished functional power of the nerve-elements, which are defective in the energy—habitual dynamogenetic force—required to overcome the resistance offered by the multiple and complicated paths that the nerve-wave has to traverse, and to make way against the contrasts sometimes produced by arrest or interference of ideas, rendering necessary for these a greater length of time to accumulate the tension required (recall of stimuli in the memory). Sometimes the transmission of nerve-waves over the associative paths is hindered, with the result that we have a complex thought which is not a simple manifestation, but the resultant of a series of images associated over a rich network of nerve-filaments, the integrity of which is quite as indispensable to the process of thought as is that of the cell-elements. It is thus that we explain the slowness of thought in individuals with cerebral tumour, which compresses the brain substance or in some other way subtilizes the network and obliges the currents of thought to take longer courses, or shuts the paths against them altogether, so that the various components of a thought do not meet, or do so only irregularly and after a long time. Hence we have the psychophysical law that the time is in inverse ratio to the dynamogenetic, or ideogenetic, force of the nerve-components, *cæteris paribus*, and in direct ratio to the resistances and the distances.

Such slowness of thought gives rise to a form of speech called *bradyphrasia*—slowness in the formation of phrases.

Morbid slowness in the course of ideas is characteristic of progressive paralysis, of lypemania—passing on to the complete arrest met with in the stuporose form (*melancholia attonitans*)—and also of hallucinatory stupor. We meet with it also, in a different degree and associated with a different mechanism, in certain cases of paranoia, in organic and in epileptic stupor, in certain forms of neurasthenia, and in epileptic and apathetic dementia, as well as in encephalomalacia. We also observe it occasionally in states

of fatigue and exhaustion, after strong excitement, and as a result of intoxication by opium, alcohol, etc.

Occasionally some ideas preponderate excessively in consciousness, where they take up a permanent abode. The consciousness has lost, wholly or in part, its power of selecting and eliminating ideas.

In normal conditions, all strong stimuli have greater permanence as images in consciousness, whether the emotion accompanying them be pain or pleasure, and the correlative groups of ideas do not allow themselves to be supplanted by others, more or less in contrast, until after some time. In some pathological conditions, often congenital, such as degeneration or grave psychopathic heredity, the percepts, like the concepts, remain for a long time in consciousness, and determine a painful state of mind, as well as a vain struggle against themselves. Degenerates, and sometimes neurasthenic persons in this condition, being always emotional, lose themselves in vain and futile representations and acts, and in useless and repeated attempts to liberate themselves from the monotonous content of consciousness. Here we always have weakness, associated with illogical emotions ; but these ideo-emotional obsessions are not systematized, they are not assimilated with the personality, nor do they assume associative relations. Certainly they impede the normal course of ideas, because they constitute a species of internal resistance in consciousness (impeded exchange and diminished eliminating power of consciousness).

We must also note the ideative void that is painfully noticeable in some forms of neurasthenia, as well as the incapacity to direct the thought. In these last cases, there is a really troublesome heaping up of thoughts that endeavour to break the associative chain of the main thought which it is desired to follow out or to express. A young man thus suffering wrote to me : ' Truly I am in torment. Certain vain reflections and a number of inquisitive and captious ideas worry my existence ceaselessly, and will not allow me that liberty and seriousness of thought that others enjoy.'

Besides the time, we must note the vivacity of thought—the degree of illumination that it receives in the visual point of consciousness.

Even from a physiological standpoint we find herein a great variety, according to the individual. There are some who certainly conceive, but their thoughts are colourless and inactive ; they hardly make their presence known on the threshold of consciousness, or they may reach the visual point only to disappear immediately without leaving any traces of their efficacy, just as if all the ideomotor paths had been closed against them. Others there are whose conception is not more active, but with them the same thoughts, perhaps in the same form, are better defined, have more colour, are more active, and have more inherent force. The laws

of reaction make it easy for us to understand that the more prompt and energetic the reaction—words, action, inhibition—the more intense must be the stimulus, which is here represented by the thought. What an influence this law might exert upon the conduct and the mode of living of the individual as well as of society as a whole !

Sometimes we hear the remark, ‘I have thought that myself.’ Yet the speaker has not been able to give form to his thought, because it failed to reach the degree of intensity requisite to determine action, or even its own expression in words. Another man has the same conception, and he announces it, or works toward the end signified by the nature of that mental representation. Sometimes it is simply a case of the more vivid colouring that the thought assumes in consciousness, and therefore the mode of feeling of the subject always comes into play. The emotional co-efficient, which, as we shall see in the following chapter, is always, or almost always, associated with the thought, is what gives more or less interest to representations, colouring them, and greatly increasing their excito-motor potential. The colouring depends upon feeling, and upon the range of associations. The thought may be involved and confused, or determinate and definite. The stronger the discriminating and eliminating power of the consciousness, taking away from the thought all those components that are least serviceable for its actual constitution, the more lucid is the thought. There is still another component, however, which we must take into account—viz., the number of associations lying latent. Not only do the images borne into the field of consciousness, through the selective power of the latter, contribute to the luminosity of the thought, but also the remotest bonds of association of that thought with others which, though they be not themselves summoned again into the field of consciousness, yet nourish its deepest roots. Many coefficients, therefore, concur to increase the energy of thought, but above all, the number and the conductivity of the associative threads, which render thought more powerful and active in proportion as they are numerous and facile, in accordance with the greater activity of the cell-elements.

The colouring and the luminosity of thought are of great significance, owing to their influence upon the reaction, which, in its promptitude, decision, and harmony, gives an index of the strength of cerebral organization. They excite and revive interest, which increases, on the one hand, the perceptive potential and the power of selection of impressions from the external world, and on the other hand, the evocative power over the mental patrimony—a power that sometimes extends its operation even to the catacombs of oblivion.

That thought and actual perceptions reciprocally reinforce one another is proved by many facts. If, for example, we forget the

name of a person whose image is clearly represented in our minds, we may be certain that the name lies buried in the hiding-places of memory, notwithstanding the futility of the efforts we may make to recall it. If the person should appear before our eyes his name at once comes to the lips. It is clear in such a case that, however well defined may be the image of the person in the visual field of consciousness, it is incapable of bringing forth the verbal representation of the name; but when reinforced by the actual impression, the verbal image comes up, the vibrations of the actual impression being added to the weak vibrations of the mnemonic image (summation of stimuli).

Facts like these are of the greatest value in normal and pathological psychology, for the reason that in many mental maladies thought has not actually disappeared; it is only weakened; it has lost its colour, and therefore cannot take up its governing position; it has no evocative force or excito-motor power. Again, a thought may vanish, driven away by other thoughts, or it may be slow of motion, poor, incomplete, colourless, and inactive.

This condition of matters is an ethnic phenomenon in some countries, and is always met with when the organization of the nervous system is congenitally poor. It is found also in all the weaklings who crowd the wide borderland separating the imbecile from the normal man, and containing a conspicuous number of frivolous and indifferent persons. The condition may also be acquired, as in neurasthenia and in states of mental decadence, whatever be their origin and their nature.

Lucidity and vigour of thought have also a bearing upon the value of psychic formations. Here we must consider the degree of fusion of the images. When the mental evolution is incomplete, the fusion is arrested at the formation of concrete images of the objects (imbeciles and idiots), whilst in men of normal evolution the fusion reaches a high development in the formation of abstract thought, attaining its highest potential, which is found in some forms of genius characterized by exceptional power of synthesis.

All the disturbances of which we have hitherto spoken do not substantially disturb the personality. With all these anomalies the personality still retains its original composition, apart from the quantity and vigour of the products of mental effort and the new emotional states, of which we shall speak in the following chapter. But thought may be altered substantially in its structure, and this induces a profound change in the personality, which is either transformed or is broken up, and gives birth to delirium or confusion.

Delirium* is a qualitative disturbance of ideation. As I have

* The word *delirium* has been derived from the Latin *de lira*, to go out of the track; or from the Greek *λήρος*, stupid talk. I think that the Latin derivation *de lira*, to leave the right course, is preferable.

already said, ideation, on the one hand, is especially founded on the mnemonic reproductions and the normal laws of association; on the other hand, it depends upon the actual perceptions which put themselves into relations with the past perceptions that have already become constituents of the personality, associating and fusing themselves with these. The personality thus constituted exercises continuous control over this process, in the sense that the personality is not transformed, but is constantly being increased by new acquisitions resulting from the percepts continuously furnished by the external world. It advances in knowledge, as it were, by stages.

The formative process of thought is altered by extraneous associative relations between preformed images, drawn sometimes from the unconscious, or between already acquired ideas and the newcomers, thus giving rise to a conclusion which does not correspond to reality. The product of this abnormal process goes under the name of *delirium*. The process of comparison is altered, and comparison is so fundamental a psychic factor, that without it we can have no idea of quality, intensity, or extension; or there is alteration of the fundamental processes of perception, and therefore we come to judge of the external world in a manner not corresponding with reality. If we see figures or hear sounds or words that nobody is producing or pronouncing, or if we hear differently from the generality of persons those sounds and words that are produced by others, or if we see figures differently from other people, or have ourselves a different idea of the parts of our own body (tactile, tactile-muscular, organic hallucinations, etc.), we end by formulating judgments upon the subjective perceptions; and these do not correspond to the objective reality, because they are merely the subjective product of an anomalous function of the sensory centres.

Some writers, like Sciamanna, make delirium include also aberrations of the senses (illusions and hallucinations), and the delirium of action (forced movements, impulsive actions).

Delirium stands in contrast with reality, although sometimes it has an air of probability. Sometimes, in fact, and especially in delirium of persecution and of grandeur, within certain limits, there may be correspondence with the abstract reality, but that reality has nothing to do with the individual who attributes it to himself.

In its evolution, delirium almost always passes the bounds of probability, and its judgments or affirmations become utterly strange and paradoxical. Sometimes these are judgments or beliefs belonging to other ages or to the lower social strata—beliefs that have long passed into the unconscious or into oblivion. Fairy tales, tales of witches and their ill-doings, the magic stories heard in infancy, religious or mystic prejudices, from almost all of which we have freed ourselves through culture and a clearer comprehension



of natural phenomena, may reappear as active elements of our judgment in abnormal conditions.

In adult age the first misfortune met with is interpreted in the fashion of the lower social strata, where such beliefs are common, being attributed to witchcraft, to evil spirits, or to demons, in contradiction to all the convictions of the normal personality. That interpretative conclusion is a delirium.

In these cases the phantasy creates nothing new ; it reproduces nothing (by atavistic reversion) that belonged only to past generations, nothing that did not belong to the same personality at some period of its evolution—generally childhood or youth.

In the process formative of the personality a number of percepts, beliefs, and prejudices become eliminated by selective power. The more advanced the evolution of the individual, the greater is the number of these rejected prejudices thrown up from the dusty archives of the unconscious. If the personality suffer disease, the records become disordered by that very fact, and the ancient documents then furnish *Ariadne's thread* for the interpretation of new facts, the origin of which escapes criticism in the changed conditions of existence. The mind produces nothing that does not belong to itself and to its *own individual history*. The idea of atavistic reversion in the genesis of delirium fails to stand the most elementary criticism. At other times there are paradoxical conceptions of the nature of dreams, manifested or not, but at once corrected by more just perception of reality.

When all the mental powers are enfeebled, the consciousness is no longer in a condition to eliminate and reject such mental products as are in contrast with its own organization or with probability, and these products acquire a peculiar power of invasion and of suggestion. The consciousness is subjected to their transforming influence, and regulates itself by these new mental products (deliria). In my youth I had a friend who made himself remarkable above all others on account of his extravagant ideas. One day, for example, on a height overlooking the Valle Frentana, he exclaimed : ' How happy I should be if I had as much gold as this valley holds ! ' That childish desire bears a resemblance to very many states of paralytic delirium.

I hold that deliria are always preformed mental products that have been eliminated from consciousness at an early date. The consciousness manages for a long time to close its field against their ingressions, but it happens that the conditions of existence of the personality gradually change, and consciousness offers less resistance to the invading power of these products.

A proof of this we have in every case where we closely examine the history of the delirious subject. A beguine who gives herself up to religious exercises is led to that manner of life by two concepts that struggle one against the other (psychic contrast). She wishes

to gain the grace and protection of God and to escape the danger of perdition. The objective of consciousness is the grace of God ; the fear of the devil and hell remains with the respective images as a threat upon the threshold of consciousness. Now, it follows that if the consciousness loses in any degree its regulative and selective power, in the case of a mental organization of this character, the grace of God disappears as the objective, and the ideative constellation of hell, demons, and damnation, with the relative emotions, is substituted for it. Thus delirium is constituted only because an old psychic formation affirms itself in the consciousness, and to this the beguine opposes ideas of defence and aspiration, which determine the character of her personality and conduct (delirium of contrast).

From religious preoccupation, or because of unhappy circumstances in her life, a woman makes a vow of chastity, or perhaps lives unwed without making a vow. The ideo-emotive group of chastity is closely associated, although in contrast, with the ideo-emotive group of love, which latter is resisted and kept upon the threshold of consciousness by the tension of contrast. A number of images, ranging from the mystic to the erotic, are continually tending to invade the consciousness, and are repulsed ; but if the selective and regulative power of consciousness decays, as often happens at the climacteric age, all these preformed ideo-emotive groups make their assault, storm the citadel, and direct the active attention of consciousness upon the external world, and the revived desires, rendered more intense by long waiting until youth has passed, give an illusory perception corresponding to the images that occupy the consciousness. Thus erotic delirium is organized, the dreams of youth being constantly revived by the unsatisfied instinct.

Here preformation by contrast is evident, and it is proved by the fact that I have always met with erotic delirium in old maids and in married women widowed while young ; or in weak males who lacked the courage to make love, as well as those who were impotent. These subjects, male and female alike, are always predisposed by heredity and degeneration, and have poor intellectual and moral resources.

Delirium due to contrast is much more frequent than is believed by the greatest authorities on psychiatry, many of whom do not even mention it. It is the effect of the unconditional surrender of the consciousness to the contrasting ideas that have long assailed it.

All the associations that offer resistance—that is to say, the products of true fusion—we judge to be correspondent with reality, and such they remain from the moment of their formation, except as regards their various combinations (*vide* foregoing).

Judgments of identity are always formed upon these, no matter in what condition they may be. All that is not considered to be

true, or that is in temporary or permanent contradiction to the ideo-emotive direction of the personality, is vanquished by the concurrence of those representations that tend to enlarge the network of associations.

Owing, however, to specific neurotic predisposition, such associations are sometimes formed with an impulsiveness of representation that is peculiar to degenerates (the psychic convulsibility of Friedmann).

There are always certain conditions which favour the formation of primary or paranoic deliria in degenerates. An emotional state of undue intensity, exaggerated subjectivity with auto-observation maintained in activity by the high emotive potential (fear, suspicion, pride), undue force and impulsiveness of new or strange associations, reduction of the normal associative powers, occasioning defect of criticism and acceptance of new psychic products that do not correspond with reality, concentration of the apperception on these new products, and, as Del Greco well says, a weak power of defence on the part of the consciousness, are so many conditions favouring the formation of deliria.

There are, therefore, two great sources of deliria: (1) Altered associative processes, with prevalence of ideas of contrast; (2) the altered perceptive processes—illusions and hallucinations.

As regards the nature of their ideative content we distinguish:

(1) *Delirium of grandeur*, or *expansive delirium*. Here the ideative process is altered in the sense that the subjects consider their personality, their interests, their possessions, and their relations in the external world under the aspect of grandiosity, of magnificence, and of power. This leads to expansivity. The *ego* affirms itself with new power, new aptitudes, and, gradually expanding, it surpasses all its neighbours and throws itself into a world of the most paradoxical dreams.

The subject has a very high tone of feeling about his own personality. Even patients who have long been timid and reserved, preoccupied with some fancied affection of the heart, lungs, or stomach, come suddenly to feel themselves no longer ill or weak, but unusually well, hyperbolically healthy and strong, capable of meeting every difficulty and of traversing enormous distances without feeling fatigued; feel themselves, in a word, to be endowed with impossible health and strength. With this exalted feeling of the physical *ego*, the psychic personality becomes transformed or dissipated in proportion as it departs from reality. The exalted sentiment awakens or generates analogous ideas, and these all give rise to corresponding conduct. It is from this cause that such subjects throw themselves without consideration into strange and ruinous undertakings, and abandon themselves to a line of conduct that is in every way new, incoherent, and dangerous.

The deliria, truly extravagant dreams that henceforth occupy and transform the consciousness, are to be explained according to the upbringing, the education, the conditions of life, and the inclination to a single order of ideas or to every intellectual pursuit. In the matter of wealth, the subjects possess hundreds of thousands of pounds, millions, milliards, etc. ; they have 'all the palaces that line a street' ; 'as much land as the eye takes in' ; 'their ships furrow every sea' ; they have the largest diamonds, the most precious stones, etc. With regard to power and rank, they have become very great Princes, Ministers, Kings, Emperors, or they belong to the most noble and powerful families ; or, again, they have become great orators, masters of moving and fascinating speech, men of political importance. In the field of religion they become reformers, saints, Messiahs, the mother of God, Christ, God, the Lord of the universe, etc.

It is very evident that the wealth of subjects and the extent of the field contributing to the growth of the delirium vary with the degree of intellectual development and culture of the affected. The delirium of an imbecile has little complication, being constituted of a restricted number of empty ideas, moving in a small, monotonous and colourless circle ; while that of a fully-evolved, and still more of a cultured, man is the product of a number of notions utilized in a special way to subserve the new thesis. It is further to be noted that in weak-minded persons whose intellectual resources are limited, the ideas of delirium more readily resolve themselves into impulsive and violent acts. Serieux and Girondon are also agreed upon this ('*Caractères du délire dans leurs rapports avec l'intelligence du délirant*'—*Arch. de Neurologie*, 1895).

We find the delirium of grandeur in maniacal states, in which case there is always a great superficiality of judgment associated with a very active, though unco-ordinated mnemonic function, and in paralytic dementia. The delirious ideas are of various grades, extending from the borders of probability to the most trivial paradoxes, as in progressive paralysis. In this psychosis the mobility of the deliria is extreme and characteristic, as well as being paradoxical in nature. The paralytics are not content with being only very rich, but pass from the idea of wealth to that of power and of boundless lordship. Deliria are like dreams—instantaneous representations that find immediate manifestation. Sometimes they are rapid in their evolution, and they always have a character of excessive mobility and empty illimitability.

The characters of mobility and illimitability are not, however, always present. I have not infrequently met with delirium of grandeur that was systematic for a long period, even in paralytics.

Delirium of grandeur may be primary, systematic, organized, and in such cases its evolution is slow. From the beginning its germ lies in the psychic personality, then it plants itself as an embryo in the consciousness, sprouting and developing there, until it covers

the whole of consciousness with its great shadow, and finally transforms it. The old mental organism is absorbed and digested by the system of delirium, which all the senses slavishly follow and obey, until another organism is outlined with the notions suggested by the delirious ideas.

The delirious idea does not always reach the stage of a complete ideo-emotive system that gradually substitutes itself for the old mental organism, for in some cases the composition of the psychic personality is preserved. As Friedmann well says, some deliria represent nothing more than the exaggeration of normal ideas. They are mild forms of systematic folly, and may be considered the whims of a morbid exaggeration of the value of the *ego* in its relations with the external world ; or they are the products of the apperceptive power acting upon the embryonic delirious idea (Del Greco).

Others, again, of a logical and critical nature, will, when they become delirious, defend their assertions by argument, thus confirming themselves in their delirium, and they may still be able to attend to their business or employments ; but the progressive transformation of the personality in time involves them exclusively in the new system of false ideas. For example, Captain X. was unwilling to remain among those ' who never did anything in life,' and he conceived and published mad projects, such as the idea of putting a great globe over one of the hills of Rome, and gathering under it all the museums and everything grand in Rome, and the notion that he was the man who could avenge the disgrace that a statesman had brought upon Apulia.

Such deliria are characteristic of paranoia, in which they are often associated with ideas of persecution. Sometimes, and oftener than is believed by many alienists, this delirium is primary and remains isolated for a long time. The youthful student at the gymnasium who keeps himself apart from others and studies intensely, with the purpose and conviction of becoming a superior man, although his labour is without result, shows in its germ the paranoic delirium of the young adult who, after long research, believes that he has solved the problem of the origin of misery and pain, and finds it in ' the sperm that onanism scatters over the face of the earth.' The mystic paranoic has a high notion of himself, and the erotic subject is a pretentious and often persecuting being. In all these cases the delirium of megalomania is primary and isolated ; that of persecution, if it be developed, is secondary and often late.

The delirium of grandeur is not necessarily the successive phase of the delirium of persecution. The latter is often arrested in its development. After observing 200 cases of delirium of persecution, Taty and Toy found megalomania absent in 32 per cent. One point on which I cannot agree with those authors is that the primary

delirium of grandeur is a rare and inverted form of paranoia, to be observed solely in the weak-minded. In Part III. of this work I shall show how frequent primary delirium of pride is, even in good mental organisms. Sometimes it appears also in old persons still possessing all their faculties (case of Ballet and Arnaud).

The delirium of grandeur is also observed, though less frequently, in cases of alcoholic insanity, syphilitic psychosis, secondary dementia, circular insanity, and in some other organic diseases of the brain; sometimes also in epileptic insanity, principally when associated with religious ideas. In this last, the subject has often an exaggerated idea of his own capacity and aptitudes, with impulsivity and liability to accessions of rage when contradicted in his ideas of his own importance.

2. *Depressive delirium*, of which, again, we distinguish several sub-species :

(a) *The delirium of melancholia*, properly so-called. This form is never primary, but always secondary to a painful affective state of mind. In such a case the delirium constitutes itself out of associations of an afflicting nature. Insignificant events of past life, to which no importance had previously been attached, assume the utmost importance, and are recognised as the cause of the intense sufferings. An error, such as is committed by everybody, gives the melancholic subject occasion to formulate the judgment that he has been incapable of doing anything at all, that he has ruined his affairs, and has therefore become wretched; that he can do nothing now, that his ruin is irremediable, and all through his own fault. The illness or the loss of an infant makes the melancholic mother think that she has been lacking in care, that she has been the cause of the death of her own child, that she has been a woman negligent of her proper duties, an unnatural mother. Another person who may have had to take an oath believes that he has rendered himself guilty of perjury. A faithful woman believes herself an adulteress, merely because she has received an honest courtesy from another man.

These deliria may remain as they originate or they may generate other deliria, according to upbringing, education, and the formative power of the mind. Once the melancholic subjects have judged themselves culpable, they complete their delirium by the formation and the association of another logical group of ideas, such as the idea of expiation, and so some come to believe themselves 'condemned to penal servitude for life,' or 'just going to be hanged'; others that they are 'accursed persons possessed by the evil spirit' (demonomelancholia); others, again, believe themselves the victims of witchcraft and of persecution by gods or human beings (secondary delirium of persecution).

The delirium of self-accusation is met with also in progressive

paralysis (E. Rossi). In this affection, indeed, we find every form of delirium without exception, and without any special significance, since they all germinate on the barren soil of dementia. It is also met with, although very rarely, in some forms of paranoia, in which the subjects hold firmly to their delusions, and yet have no feeling of resignation. According to Séglas, the delirium of self-accusation is sometimes systematized in subjects hereditarily afflicted and unbalanced, in whom we find mingled pride, egoism, timidity, and diffidence. It presents itself as a system constituted of delirious interpretations applied to past and present life, and has not the fixity of true melancholic delirium. Remissions occur with remission of the moral suffering in these cases, or else it assumes a stereotyped form; or, again, there arise ideas of grandeur and of persecution with which the delirium associates itself or alternates, and in this case it is an exaggeration of the natural character of these subjects. I must warn my readers, with regard to the diagnosis, that, when the delirium of self-accusation or any other depressive delirium is associated with the delirium of grandeur, we have often to deal with dementia paralytica in course of evolution.

(b) The *delirium of metamorphosis*, or transformation into some form of animal (lycanthropy). This form is met with much more rarely to-day than in past centuries, including even the first half of the nineteenth century. I have observed only one case, which occurred a few years ago.

(c) *Delirium of Negation*.—Depressive delirium may reach a very high stage in the negation of everything. In these cases the sufferers affirm that 'they have no longer any family,' 'they have no longer anything,' 'everything is lost,' 'the city is deserted of men; indeed, none are left alive,' 'the heart no longer beats, and the blood has ceased to circulate.' As in the case of the lady I mentioned before, such delirium reaches the complete negation of the personality.

Cotard and others have assigned undue importance to the delirium of negation, attributing to it certain clinical characters, many of which, as a matter of fact, are common to the majority of cases of depressive delirium, such as self-accusation and hypochondria, of which it represents a more advanced stage of evolution.

Only one of the deliria of negation, the hypochondriacal, has the significance that the Italian observers, Obici ('*Osservazioni nosologiche cliniche sul così detto "delirio di negazione,"*' Riv. Sper. di Fren., vol. xxvi.) and S. De Sanctis ('*Psicopatologia delle idee di negazione,*' Il Manicomio, 1900) have attributed to it, departing far from the ideas of Cotard. When the evolution of hypochondriacal delirium has reached such a point that the sufferer asserts that he has no longer any stomach, any head, any organs,

then there generally exists a basis of senile involution or other degenerative process, and we can no longer speak of psychoneurotic melancholia.

These ideas arise either through the evolution of pre-existing delirious ideas or concomitantly with such ideas and without any evident nexus therewith. I have observed this many times in senile melancholia and in progressive paralysis. Sometimes they arise even in young people, owing to the evolution of hypochondriacal paranoia. They often make their appearance in the acute psychopathies due to intoxication and accompanied by hallucinatory mental confusion.

In many of these cases there has been a precedent negational constitution, a fact that has also been observed by De Sanctis.

If the delirium of negation be considered in a wide sense, as it seems to me it must be considered, and not merely within the limits of hypochondriacal delirium of negation, it is met with in very varied psychopathies : in melancholia, in mental confusion, in progressive paralysis, and in senile dementia. In melancholia it may be the first delirium, and is then sometimes substituted by others, or the final delirium, which often becomes stereotyped. Whatever be the clinical form, the delirium is the chief manifestation, and recovery depends not only on the particular form of delirium, but also on the most varied contingencies and conditions, intrinsic or extrinsic to the patient.

The delirium of negation of varied content—if we make exception of the hypochondriacal—is quite as significant as any other delirium of depression. Like that of self-accusation, it germinates most easily on hereditary soil, and in the germ we find it associated with all the painful or afflictive states of mind, including the physiological. In the struggle for existence, want of success, discomfort, discouragement, are accompanied by ideas of negation. The poets, in whom the afflictive tone predominates, have manifested ideas of negation, or have put them into the mouths of their characters.

Leopardi in his greatest affliction enunciates the most solemn negation when he says :

‘ A noi presso la culla
Immoto siede, e su la tomba, il nulla.’

‘ Beside our cradle sits unmoved, and on our tomb, nothing.’

And again :

‘ Ecco tutto è simile, e discoprendo
Solo il nulla s’accresce.’

‘ Listen : all is alike, and by our discoveries we only add to nothingness.’

Ugo Foscolo, the immortal poet of the tombs (*‘I Sepolcri’*), was also of a melancholic type, and expresses ideas of negation with

regard to the highest affirmation of Nature when he says in his poem to the sun :

‘ Ma tu giammai, eterna lampa, non ti cangi ? Mai ? . . .
Pur verrà dì che nell’ antiquo voto cadrai del nulla. . . .’

‘ But dost thou never change, eternal lamp ? Never ? . . .
This will be for that in the ancient void thou wilt have come from nothing.’

Shakespeare represents the negational type in Hamlet when he makes him say :

‘ . . . And indeed it goes so heavily with my disposition that this goodly frame, the earth, seems to me a sterile promontory ; this most excellent canopy, the air, look you, this brave o’erhanging firmament, this majestical roof fretted with golden fire, why, it appears no other thing to me but a foul and pestilent congregation of vapours.’

Goethe, speaking of the genius of evil, calls him Negation :

‘ Ich bin der Geist der stets verneint . . .
So ist dann alles was ihr Sünde,
Zerstörung, kurz das böse nennt,
Mein eigentliches Element.’

‘ I am the Spirit that denies everything ; and so all that you call sin and destruction—in short, Evil—is my proper element.’

Pain, weakness, negation, are three indivisible terms, three aspects under which we may consider a state of mind that passes by infinite degrees from the physiological episode to the most intense melancholy, in which negation reaches lycanthropy, metabolism of the proper personality, or the complete negation of one’s proper existence, that under another form expresses itself in suicide.

The woman who denied her own existence, failing to recognise her own identity, recovered completely after almost three years of this stereotyped delirium, although she belonged to a family in which three other sisters were epileptics and one a morphinomaniac. We can draw no sure criterion for the prognosis from the contents of such depressive deliria, nor can we agree unconditionally to the distinction between ideas of negation and delirium of negation, systematized or not (Séglas). These deliria, like all others, are nothing but preformations of badly-organized minds (degeneration) that have been repelled by ideas better answering to reality ; they are often the episodic or the systematic exaggeration of normal ideas, and may be met with in many psychopathic states (Camuset and others).

The systematization depends upon conditions extrinsic to the genesis of the delirium itself.

In the formation of hypochondriacal delirium of negation we generally find gradation of intensity of the delirious ideas, be they primary or secondary. It begins often with a vague apprehension

as to personal health (kinæsthetic emotivity), and as this increases it puts the mind into an orgasm. The imminent danger to his health, 'already in a very bad way,' absorbs all the interest of the subject, who later on interprets in the light of the besetting idea, those new sensations that either arise directly from the cerebral malady that has altered the mode of feeling of the somatic *ego*, or are derived from the concentration of attention on those parts of the body that are believed to be suffering (peripheral projection of the preperception).

Gradually the delirium takes the form that 'a serious illness,' which the sufferer often does not specify, 'will carry him off in a short time,' or that 'some organ or other is in course of destruction—is almost consumed, or is putrefied,' etc.

'Nothing will pass down my throat'; 'nothing can enter my stomach, which is closed'; 'my anus is blocked up'; 'my body is already putrefying—I can even perceive the corpse-like smell'; 'my arm has turned into wax'; 'my heart no longer beats'; 'I am impotent, for my penis—which was perfectly developed—has become as thin as a goose-quill.' These are examples of hypochondriacal delirium of negation and metabolic delirium. This sometimes reaches the same height of absurdity as the delirium of grandeur in progressive paralysis, when the subjects declare that they have no stomach or no anus, even though they eat or are fed with the stomach-tube, and evacuate the intestines regularly.

The succession of the phases of hypochondriacal delirium, from simple preoccupation about personal health (hypochondriasis) to hypochondria with delirium of negation, has been noted by Ball, Ritti, Vallon, Marie, Cotard, Castin, and others. Such delirium, however, is not very frequent, nor is it so systematic as some have affirmed: and the ideas of negation do not always arise in the last phase of chronic hypochondriacal delirium, as is maintained by Cotard. Sometimes the hypochondriacal delirium is not isolated, but is associated with other delirious ideas of persecution and of self-accusation.

Hypochondriacal delirium has its roots in a perversion of the kinæsthetic sense, and may be considered as essentially a malady of the somæsthetic zone.

(d) *The Delirium of Persecution*.—This form is more frequent to-day than in past times, and the persecution is by human beings, whereas formerly it was by supernatural beings. As a rule, it is the principal factor on which the whole psychopathy turns, but it is frequently met with episodically in almost all psychopathies, even in mania and in progressive paralysis. In these cases it is more or less fugitive, and sometimes it is provoked.

This delirium consists essentially in the fact that the individual affected believes that he is the object of persecution on the part of others, and in the external world he has false perceptions, not

only of the danger threatening his person, his honour, or his interests, but also of the means by which it is sought to offend or to destroy him, and sometimes even of the persons who are implacably conspiring and working against him. This delirium once confirmed, whether it be secondary or primary, furnishes the subject with a notion that is intensified by the products of the misinterpreted sensations that develop sooner or later with the delirium. In delirium, illusions and hallucinations have the same value as analogous perceptions furnished by observation have in normal ideation.

For example, the delirious subject, who considers his honest wife an adulteress, reads the signs of treachery in her attitude, her looks, even in her caresses, and finds in all of these, snares that she is laying for him (illusory preperception). For hours he paces to and fro before the door of the bedroom in which the unhappy woman is shut, and peers through the keyhole ; when he goes away he puts marks on the door to assure himself that it has not been opened during his absence. With threats he examines her genitals to find traces of a recent embrace. He watches through the night, and in the noises that his exalted sensory centres make him hear, he finds irrefragable proof of the wrong done him by his infamous consort, who permits her gallant to penetrate into the nuptial chamber in his very presence.

Other subjects feel that they are the objects of troublesome attentions on the part of outsiders ; 'a watch is put upon them in order to spy out anything that may be censurable in their conduct : they are no longer treated with the same goodwill as before.' Everything around the subject assumes an attitude of hostility to him. At first he only suspects that others wish to do him harm, but his illusions become confirmed and give him matter for false conclusions—*e.g.*, an article or an innocent advertisement in a newspaper is a taunt or an accusation ; the priest is alluding to him in his sermon, etc.

Others believe that their minds can be read and that their most secret thoughts have become public property. The gestures and the attitudes of the people they meet are all against them : they have become butts for taunts and mockery ; coughing or spitting is an insult meant for them ; the contents of a speech are an offence to their politics or their religion, etc. They no longer feel secure either at home or in the streets, and they are always suspicious, restless, and sleepless. At last they come into possession of irrefragable proof that they are victims of the darkest malefactions, and this they know directly. Enemies are lying in wait for them with the basest arts. If these enemies are not special persons, they are associations or corporations, such as the police, the Freemasons, the Jesuits, the Socialists, etc., and they employ the telephone, electricity, or poison, which they find means of

administering in food, water, or in the very air that is breathed. If, meanwhile, hallucinations supervene, always homologous with the contents of the ideas of delirium, the delirium reaches its acme, the constitution of the primary personality is more or less disarranged, and a new direction is impressed on the whole psychic life of the subject, who either is fatally influenced by the idea of persecution and poses as a victim, in a depressed state of mind, or he turns upon his presumed persecutors, denounces them, and runs off to lay an accusation against them before the Public Prosecutor ; or his resentment takes a violent form, and he does justice with his own hands against his presumed enemies, the persecuted becoming persecutor.

Bruni, at whose trial for the murder of Marquis Berardi, in the provincial asylum at Rome, I gave expert evidence—believed that he was persecuted by a widely-extended antihumanitarian sect, of which he declared Crispi to be the head. Berardi was chairman of the asylum board of directors, and his haughty and authoritative proceedings during his visits of inspection of the asylum buildings led Bruni to argue that the Marquis belonged to that sect. As soon as the Marquis came within reach, Bruni dealt him a premeditated blow on the back of the head with an iron rod, felling him to the ground. This is an example of the persecuted turned persecutor. I am inclined to admit the two types well defined by Falret and Laségue—Falret's type of reasoning persecuted subjects, who almost never show hallucination in the long course of the malady,* and Laségue's type of persecuted subjects with hallucinations. The first, much less numerous than the second, are not very dangerous, and at most they are dangerous only to the persons connected with the event that is the basis of their delirium. As a rule, they are rather troublesome than dangerous ; they prefer to write and to denounce their persecutors rather than to execute justice with their own hands. The subjects with hallucinations are much more dangerous, and to a much wider circle of persons, according to the nature, the content, and the vividness of the hallucinations.

These hallucinations arise very early, long before the delirium is organized—that is to say, in the period of unconscious preparation, when the affective tone of the mind is altered. In such cases the evolution of the delirium is rapid, because the hallucinations furnish the system of delirium with ready objective proofs—the subjective perceptions. The hallucinations, however, may arise at a more advanced evolution of the system of delirium, which is fed by simple illusions.

In general, therefore, the delirium of persecution, like every other variety of delirium, besides being substantially constituted of a qualitative disturbance of ideation, is ordinarily associated

* Cases of late hallucinations of Falret's type are not rare ; one has been published by Vallon.

with other disturbances of the more elementary activities of the mind, such as an emotive state with a particular trend, the disturbance of association already mentioned, and sensory disorders. Often the illusions and hallucinations that confirm the individual more and more in the false notion he has conceived concur in the more rapid and certain transformation of the primitive personality into another that is more substantially constituted of groups of false ideas.

5. Another delirium, apparently depressive, but in substance expansive, is the *religious delirium*, to-day much less frequent than it was in the past. The majority of its subjects are timid, proud, poor in spirit, and resigned, and they have a strong inclination to religious practices, often accompanied by ostentatious vanity. They are enthusiasts, one-sided individuals, fanatics. Two factors concur to a very great extent in the development of this delirium—the diminution of the apperceptive power over reality, and the mystic encumbrance of the mind, increased by reading sacred books, by concentration of the mind on doctrines, dogmas, and religious ideas, and by impoverishment of the blood and the entire organism through repeated fasts, prolonged vigils, penances, discipline, and other rigours of religious life, and frequently onanism. These are aided by misfortunes, by disappointment in love, and by preaching that exalts the fancy of the believers. On a soil thus prepared the delirium arises, either primarily or preceded by illusions or hallucinations of a religious character.

The sufferer commences by supposing that his fasts, his chastity, and his penances will free him from all traces of the earthly, and that he, thus purified, will be taken into particular consideration by the Almighty. Thereafter begin the sensory disturbances, with which he completes the false concept by way of association. He imagines that a high religious mission has been reserved for him, and that a great reward will be decreed him by Heaven for his irreproachable conduct. From this simple supposition the delirium is concreted and takes consistency, because the subject, without reflection, and impelled by illusions and even hallucinations, accepts the idea that he is an apostle of the Word of God, a prophet, a saint, and reformer. Great powers have been conferred upon him, and henceforth he is freed from the cares of the common life, his high duty being to convert the unbelieving and to reform the world. From this stage the young apostle gradually becomes the saviour of the world, and the illuminated young woman the mother of God.

Such religious delirium is often found episodically in the acute sensory phrenopathies, and then has its origin in primary hallucinations, like the delirium of persecution. It is found also in a fugitive form in alcoholic and in epileptic insanity (Mabille). Sometimes it assumes the character of what Prouvost has called prophetic delirium, which is hallucinatory and quite distinct from the belief—

common to all peoples and to all religions—in the possibility of communicating with supernatural beings, benevolent or malignant, who give warning of future events through such media. We can distinguish vesanic prophetic delirium, which is found more or less stereotyped in almost all forms of insanity based on degeneration, from hysterical prophetic delirium, which is more typical and sometimes epidemic. I have frequently met with it in the hallucinatory terminal phase of the grand attack of typical hysteria.

Systematized deliria either transform the whole personality, the mental patrimony undergoing the phagocytic action of the delirium and becoming assimilated by the predominating false idea, or their assimilative power does not extend over the whole mental patrimony of the personality, which, although it assumes the particular cast impressed upon it by the false content of consciousness, yet has still at command for the normal government of life a larger or smaller portion of its former acquisitions.

These various forms of delirium, of whatever origin, may succeed one another, may be confused, and may coexist. The megalomaniac who meets with derision, and who notes that not one of his ideas finds acceptance, and that not one of his projects is carried out, draws therefrom the inference that envy is raising up enemies against him, and is planning all manner of evil to do him injury (consecutive delirium of persecution).

On the other hand, through association by contrast, the persecuted subject convinces himself that the persecution of which he is a victim has its *raison d'être* in the fact that someone has an interest in wounding his honour, in humiliating him, because he has superior qualities that throw the qualities of others into the shade.

The same thing happens with religious delirium, which is often a mixture of delirious ideas of religion, grandeur, and persecution. Sometimes the delirious ideas are of diverse content from the beginning, and in such a case the delirium is indeterminate. There is always present an anomalous emotional state of fear and pride, and it is by the predominance of one of these two emotions over the other that persecuted subjects are distinguished as *humble* or *proud*. The humble submit to the persecution, do not offer to take the offensive, and have a tendency to suicide, in order to escape the persecution. They show gradations, and the first in the series are plainly paranoic, while the last tend to confound themselves with the melancholic. The proud are generally aggressive.

All these paranoic deliria grow in a soil of degeneration. On this point we may agree with Renè Semelaigne, who refuses to admit a chronic delirium (Magnan) distinct from the delirium of degenerates. Further, the chronic deliria of persecution of neuras-

thenics, who are curable, are developed on the degenerative neurasthenic base; often through hereditary taint.

The other varieties of persecuted subjects, the alcoholic, those of the climacteric period, the senile in all their varieties—the jealous, the litigious and querulous, the revengeful (Cullerre), the erotic, all more or less criminal—and the cases conforming to no type (Ballet), the paranoics in general, it will be more convenient for us to consider in the third part of this work.

Here, however, I must not fail to call attention to a form of systematized delirium that is clearly hallucinatory. There exist two varieties of it. One comprises cases in which hallucinations of one or more senses are repeated in a uniform manner, determining a range of false thoughts that are rapidly systematized; of this variety acute (curable) and chronic cases occur. The other variety comprises cases in which there has been a precedent sensory delirium, but the hallucinations that prevailed in the course of the phrenosis remain as a residuum, with the corresponding delirium, which is systematized as in the primary delirium, and is susceptible of a slow cure (Lojacono and Angiolella's cases).

From what has been hitherto said, it will be easily understood how some authors have come to speak of partial deliria and of general and total deliria. The delirium is general either when the whole ideation is altered, so that everything is falsified and thrown into disorder, or when a single group of delirious ideas has left a good part of the field of ideation in sound relation to the external world for a certain time, but has gradually absorbed everything, and assimilated the ideative content of the old personality, finally overturning the whole perceptive process in order to make way for itself.

Even though we accept the term 'partial delirium,' it is not difficult to see that this is not what it would appear to be after a superficial analysis; that besides those false ideas that manifest themselves most readily, there exist others more latent; and that the whole mental life in its diverse manifestations is affected by the partial transformation of the personality.

There exist, also, forms of generalized delirium, usually hallucinatory, attended by obscuration of the consciousness (Francotte), with loss of the notion of time, place, and persons. These forms correspond to the hallucinatory mental confusion described by Chaslin, to some forms of sensory phrenosis (Bianchi), to the acute sensory delirium of Krafft-Ebing, and to the 'Verworrenheit' of the Germans. Such deliria are always toxic, if acute, and they have their counterpart in the initial deliria of typhoid fever, as described by Aschaffenburg.

One variety of generalized delirium we have in those cases that Pichon, confirming the opinion of Regis, calls 'deliria oneirica,' or deliria of dreams. These deliria are constituted of scenes from

dreams, changing, varied, and uninterrupted, the subject being as if he were in a somnambulatory dream. These occur generally at night, but sometimes they continue after waking. On recovery, the patient has no recollection of his delirium. These cases, like the other variety of acute generalized delirium, are of toxic origin.

With regard to their origin, deliria are divided into *primary* and *secondary*. *Primary* deliria are represented by anomalous ideative associations, not preceded by an affective condition of the mind, depressed or exalted, as in melancholia and maniacal states, nor by sensory disturbances—illusions or hallucinations. In this case the profound alteration of feeling and the sensory disturbances follow the appearance of the delirium, which announces itself in consciousness as a new affirmation. In the adult mental organism its germ represents what an embryonic histological element, that had its hierarchic biological position assigned to it in the genesis of the organs, represents in the midst of tissues that have become specialized. Here the embryonic element lives, but it lies latent, and does not disturb the life of the organ in which it is lodged until it finds favourable conditions for development, when it gives rise to carcinoma or sarcoma, which invades or gradually substitutes itself for the organ in which it is developed, threatening the life not only of that part, but even of the whole organism.

The greater number of primary deliria, as also of secondary deliria, contain a nucleus that has belonged to the mental organism in one phase of its evolution. In the actual mental organism those nuclei represent true embryonic elements, to which sometimes correspond modes of speech that have their counterpart in the language of past generations or in that of childhood. These are the neologisms (Tanzi).

It is much discussed whether there is not a precedent particular emotive state in all these cases, and for my part I agree with De Montyel ('*De la genèse des conceptions délirantes*,' etc., *Gazette des Hôpitaux*, 1900) that the anomaly of kinæsthesia is the main factor in systematized deliria. The emotional tone is the true field on which deliria germinate. These deliria, which are resultants of allegoric representations, are a secondary phenomenon, due to association between emotional states and ideas.

If we wish to be strictly accurate, we ought to say that all deliria are secondary, only it is well to add that in the primary the emotional state is less evident and less intense.

Secondary deliria are generated by abnormal affective states, painful or exalted, or else by sensory disturbances. In the first case the delirium develops through association of ideas corresponding to the predominating emotion. In the second case the false ideative content is furnished directly by the altered perceptive relations between the subject and the external world, and by the

disturbed associative process. The deranged sensory functions supply false notions, and these furnish the elements for the constitution of the delirium, which will be general or partial, systematized or not, according as the hallucinations are multiple and tumultuous, or single, uniform, and persistent.

As, in the course of thought, there are presented ideas that are coloured, active, and efficacious, so in deliria we can distinguish those that are more or less active, those that run their course with correspondingly vivacious affectivity, and those that are colourless and lacking in dynamogenetic force.

There are also rudimentary deliria, which become concreted especially with the concurrence of false perceptions, just as there are in normal life rudimentary ideas which, in given circumstances, are concreted with new observations. Active deliria with great dynamogenetic energy are present in some cases of psychoneurosis, in paranoia, in alcoholic, epileptic, or hallucinatory psychosis, as well as in any other psychopathy, before the onset of the consecutive and fatal mental weakening (consecutive dementia), in which last case even the delirious ideas suffer from the weakness that overtakes the whole mental life.

Then there are separate forms of deliria that do not belong to one particular psychosis only, but are the expression of a profound disturbance of the whole psychic life, whatever be the clinical form of the psychosis, but especially be it progressive paralysis, paranoia, or consecutive dementia. Among these deliria we shall consider particularly—

Metabolic Delirium.—Here everything, in the opinion of the subject, has changed the nature that universal consent attributes to it :—‘ the patients are lords,’ ‘ the sick are ministers travestied,’ ‘ the asylum is the royal palace,’ ‘ the name that I bear is not my true name,’ ‘ I was born indeed, but I came into the world at Fontainebleau,’ ‘ my daughter is only an adopted daughter,’ etc.

Some admit also a *delirium of recognition*, or *palingnostic delirium* (Mendel). The essence of this delirium is that the subject believes that he recognises in everything he sees for the first time, or in a position that is quite new to him, an object or a person that he had known before, or a position that he had occupied before. These deliria are met with in various psychopathic forms with weakening of the intellectual functions, especially of the memory (see preceding chapter). A delirium like this, which is a higher grade of paramnesia, is found in paranoia, owing to false associations of ideas, and very frequently in paralytic dementia and senile dementia. It is very easy to find a paralytic subject with expansive delirium who will address you by name, and insist, although he sees you for the first time, that you are his friend ‘ Caius,’ ‘ his dear friend,’ that you both met ‘ in such and such a family,’ etc. Error as to locality is more frequent. One of Mendel’s alcoholic subjects on first being

received into the establishment said : ' Everything here seems to be as well known to me as if I had been here before.' A paranoic observed : ' Nineteen years ago I was in this very room, with the same pictures, the same furniture, and the same gentlemen.' The edifice had been built hardly six years before. These disorders are better considered as affections of the memory.

Delirium is distinguished into acute or chronic, according as it develops and runs its course very rapidly and tumultuously, or slowly, as we have mentioned above. In the first case the personality undergoes a rapid and complete transformation. In the second the transformation is much slower, and sometimes partial.

Mental confusion consists in the dissociation of ideas, in the incapacity for reciprocal evocation, and the difficulty, in the more serious cases, of recognising the objects of the external world. This leads to a dysorientation of the personality in time and space. The personality is no longer sure of itself, the judgment of identity is confused and uncertain, as if the subject had lost the thread of his history by which he might transport himself into the past, and the thread of imagination that leads to the future.

With the dissociation of ideas there disappears the syntactic, and sometimes also the grammatical, form of thought.

Isolated groups of ideas, succeeding one another without any bonds of association, and wanting any correspondence with real things, follow one upon another, like the ruins of an edifice that has crumbled away ; but these ruins give evidence of the former construction, and the remaining decorations enable us to recall the modest habitation of the bourgeois or the luxurious mansion of the rich man. We must recognise a long gradation of confusion.

From the fleeting interruption of thought and speech due to an obstacle in the associative paths, or to interference, or to difficulty of evocation, causing the speaker to lose hold of his subject and to wander into another field, to the more serious dissolution of the whole mental content, there is a very long series of forms or grades of mental confusion. In the lowest grades the subjects, generally neurasthenic, lose the thread of their ideas, remain at a loss for a time, and then sometimes exclaim : ' What was I saying just now ?' In such cases the grammatical and syntactical form of speech is maintained, but the logical form is not always strictly preserved, the nexus between the inference and the premises, or between the conclusions and the subject of discourse, being sometimes wanting (*dyslogia* and *paralogia*). In the more serious cases, passing through agrammatism and akataphasia, we arrive at the greatest confusion of expression, where not a word has either its regular grammatical inflection or a nexus with the preceding or the following words. The disorder of the cerebral activity is expressed in rapid and confused language, a veritable flight of dissociated words, sometimes

whispered, distorted, and not at all intelligible. This differs much from *tumultus sermonis*.

These states of confusion may be either acute or chronic. When acute, they are determined by hallucinations in the majority of sensory phrenoses, of whatever pathogenesis—infective, auto-toxic, alcoholic, febrile, etc.

The chronic form we find in consecutive or secondary dementia, whatever be its origin or the nature of the malady it succeeds. Sometimes the consciousness is void of ideative content; no representation is formed there or is recalled, either by external stimuli or by any other mechanism. This is the case in states of profound stupor, or in the so-called amentia of Meynert and others. Both the confusion and the stupor may be interrupted by hallucinatory episodes, which are the momentary and fugitive reproductions of those more or less intense states of hallucination that originally determined them.

Incoherence of speech, which coincides with incoherence of thought, corresponds to the so-called *dyslogia*, which is divided into *alogia* and *paralogia*. Accordingly, we may have *aphrasia* and *paraphrasia*. The latter is always connected with paralogia, whilst aphrasia does not necessarily coincide with alogia, for there exists a superstitious or voluntary or *thematic aphrasia* (generally found in paranoic and in hysterical subjects). Paraphrasia is to be met with in all forms and grades of mental dissociation (incoherence), and, as regards time, both with great rapidity of thought (*tumultus sermonis*) and with slowness of thought (*bradyphrasia*).

We distinguish verbal paraphrasia, characterized by the use of wrong words introduced into the discourse without the speaker noticing them; he is not aware of the error, as he intended to pronounce the right word. This gives a somewhat ludicrous and baroque turn to his speech.

Disordered speech, the passing from one hundred to one thousand without going back to the proper starting-point, goes also under the name of *thematic paraphrasia* (Arndt).

This inconclusive form of speech, wandering from the subject-matter, is met with in protracted paranoia, in secondary dementia, and in all states of profound mental decadence.

On the other hand, if the formation of ideas and of thought is disturbed in its whole extent, so that it is only with difficulty that a single proper judgment can be expressed, and if new words are coined to express the imperfect and strange thoughts, such neologisms being but maimed fragments of regular words, veritable heaps of syllables, then we have *paraphrasia vesana*, an effect of profound psychic decadence.

The altered structure of words in many cases gives the appearance of paraphrasia, and it is such in form, but the mechanism

coming into play in the formation of true paraphrasia is very different from that in paraphrasia vesana.

Both thematic paraphrasia and paraphrasia vesana are accompanied by disordered syntax. The power of inflecting words regularly and of ordering them in series is injured. Such disturbance passes under the name of *agrammatism* or *akataphasia* (Steinthal).

Sometimes the subject is indeterminate, and the pronoun is replaced by the proper name.

Here is an example of paraphrasia vesana, with asyntactism and akataphasia :

Oh, cittade tutta di si
 bel tuo cielo,
 Che Napoli discese a di
 signoreggiar Regina
 Fra le di tante inumeri
 cittadi adfini
 Ove l'ingegno ad arte di com-
 merci industrie
 I tanti di tanti donne madri
 figli e figlie nacqui
 a d'immortalarsi per
 sempre
 In forza di quella fede a
 di caritade simbolo
 Qual di reggendone sicurtade per
 piú di ciò che
 ebbero
 In di tradizione lettine ed
 uditin verbi
 Di quelle parole prime
 uditin voci scritte d'avuten libro.*

Dysgrammatism may be voluntary or involuntary. It is voluntary in some forms of paranoia, as when the patient believes he has to transform the language and grammar, so as to correspond with

* The example given above can hardly be translated. The following utterances, committed to paper as they fell from the lips of a patient in Hawkhead Asylum, may serve in its stead :

'I'm a jointer born child being 'culiarly born in my mother's womb for to catch the end to benefit you doctors. It stands to reason a young child is unable to carry the grandmother within the frame of the frame. We've all got condemned criminal cases to face for sucking the breath of the young towards our own breath. My cousin used to domeer over I, and we were playing just naturally playhood but the boy pulled the heart because its a thought poit toit heart twitch. My enemy sucks through the babehood's breath, that is the liquid confidence we should grow on, that is the quick impulsitive towards the delivery of speech. The confidence and nature are in your hands ; that's why you have so striprous patients, because the nature is so close, that is like the drum button. You're as near as any blood confidenter, just equal towards the young children totting about. Now be careful towards incontring my enemy. I stand towards this building as towards a thefter and poit it from her. The talenters are not to be born again. . . .'—J. H. McD.

his altered formative process of thought, or in order to give greater distinction to his altered personality. It is not unusual for the patient to speak of himself in the proper name—*e.g.*, 'Fabrizio (instead of *I*) demands the restoration of his rights.' Again, the verb may always be put in the infinitive (regression).

More frequently the disturbance is involuntary, owing to advanced mental decadence.

I have mentioned that words pronounced by others are sometimes repeated without being understood in cases where a destructive focus exists. The same phenomenon arises in the mental disorder occurring in some forms of dementia, especially paralytic dementia. In such cases words cease to be symbols of thought, and simply represent sounds or voice productions. The repetition of these, when not understood, goes by the name of *echolalia*, or, better, *echophrasia* or *dysphrasia imitatoria*.

More or less profound disturbance of thought is revealed in many other forms of dysphrasia, very well described by Morselli in his valuable *Manuale di semiotica delle malattie mentali*. Here I shall mention only verbal automatisms, such as the intercalation of a word or phrase between every two or three words. 'Naturally,' 'you understand,' 'really, now,' are very frequently used by sane persons, but they always show the prevalence of automatism, and the want of governing power over the form of speech and the choice of words. A melancholic subject in my clinique became quite oppressive because he interlarded his speech with 'really, now.' 'Really, now, you cannot understand, really, now, how much I suffer, really now. . . .' This dysphrasic disorder goes under the name of *embolophrasia*. If the interjection is an obscene or offensive word, as when the patient in talking with the friend who has come to visit him hisses in his face the word '*merde*' or '*cochon*' (cases of Charcot and others), or another word very frequent in the low speech of certain Southern countries, the automatism is stronger, and it goes under the name of *coprolalia*, or, better, *coprophrasia*.

CHAPTER V

EMOTIONS AND SENTIMENTS—PHYSIO-PATHOLOGY

So far, we have been occupied with only one side of the mind, extending from perception to the highest products of the intellect, and we have purposely refrained even from mentioning the emotions when we spoke of the sensations, so that we might deal with them in due order in a special chapter, and at as great length as the nature of this work will permit.

Sensation contains in itself two germs that develop like two branches of the same tree, which we take as a symbol of the psychic personality. One represents the intellect and its various degrees of evolution, the other the degrees and forms of feeling and of emotion. The one has reference to the external world and its relations, translated into images and their associations; the other to the modifications of the *ego*, provoked not only by external stimuli, but also by simple and complex mental products. The one undergoes constant development, and, with the constant aid of grafts from the external world, it is always producing new branches and new fruits; the other is ever expanding from the elementary emotions of pleasure and pain, and embraces and adopts the emotions and sentiments of all its fellow-beings scattered over the face of the globe. The intellect finds its objective in knowledge of the universe; the sentiments are the effect of experience of the mutations of the *ego* in its social relations, and tend to the fusion of human consciousness in its aspiration after pleasure and its struggle against pain.

Our knowledge of the emotions would, therefore, not be complete, with regard to the present state of science, without a complementary acquaintance with kinæsthesis.

In the study of the emotions kinæsthesis represents, as it were, the soil in which they germinate. On the one hand it furnishes the somatic phenomena of the emotions themselves, and on the other it predisposes to representations, which are the other constituent elements of emotions.

The kinæsthetic sense is the synthesis of all the sensations, in

which the organic personality is summed up. Information of all the organic functions and of all the work done by the organs in the various organic functions of life is transmitted to the superior nerve-centres. From all parts of the organism, even the least important and the most distant, there is a continuous flow of nerve-waves, establishing relations between all the organs and the superior nerve-centres. To these are united all the specific sensations through which we experience an infinite series of mutations due to immediate contact with the external world, the ultimate result of these being the progressive comprehension of our own organism, which becomes ever more distinct from the environment, thanks to the mnemonic reproduction of all the physical qualities of the medium, and of the modifications that the organism undergoes under the influence of the agencies acting upon it.

The informative waves from the organs to the nerve-centres do not excite true states of consciousness, and therefore do not give rise to sensations in the strictly physiological sense of the word, but they are confluent in a chamber of harmonic resonance, the waves of which are represented in consciousness as the sense of our own proper existence.

This sense, which goes by the name of kinæsthetic sense, if not an active element of consciousness—if, in other words, it is not clearly representative—nevertheless gives a particular tone to consciousness, and it undergoes constant modifications itself, just as consciousness is modified under the influence of external agents. The kinæsthetic consciousness becomes more prominent in cases of difficulty of function, and in all cases of conflict, as a result either of intensity of the external stimuli (pain) or their absence (anæsthesia, hypæsthesia, paralysis), or because of an intensified general tone, or a dissonant note arising from some organ and disturbing the harmony of the waves in the chamber of resonance. In this case there is a feeling of discomfort and of lowering of tone, and the result is a new attitude of the consciousness. It is the kinæsthetic sense that regulates the sensibility of the personality, which is one of the factors of emotivity.

We must add that the variations of the tone of the kinæsthesia tend to recall to consciousness, through the law of association, determined categories of ideas, aspirations, and tendencies, whence arise those particular attitudes that represent the inclinations and emotive susceptibilities peculiar to separate individuals.

The anatomical field of the kinæsthesia may be considered to be the greater part of the cerebral mantle, in so far as even the specific senses in their respective zones possess their own motor centres, and perhaps also tactile representations; but certainly the centre of greatest kinæsthetic intensity is the somæsthetic zone, described in detail in the first part of this volume, and this is perhaps one of the starting-points of certain somatic phenomena of emotions, just as

it is the point of confluence of all the representations reaching it from the respective areas, according to the well-known law of the reflexes.

There is no emotion or sentiment that has not its root in the kinæsthesi; there is none that has not been prepared in its great laboratory. It is that which gives the individual emotive sensibility, which participates, probably, in the mechanism of expression, which lends colour and emotive direction to representations.

In truth, emotions and sentiments are only evolutionary grades of states of consciousness, with more or less complicated and conscious reflexes. The first of these is the fundamental sensation of pleasure or pain, which simple stimuli, penetrating the kinæsthetic sense, produce in contact with the body. The higher emotions are products of the sense attached to the moral and intellectual field, and accompanying the struggle and rush for existence. This evolution is due to the progressive fusion of new components that are furnished by the relations of each individual with others, so that the primitive sensation of pleasure or pain, from being individual, becomes universal.

On the other hand, pleasure and pain become more complex through the development of the nervous system, since the differentiation of stimuli—rendered possible by the progressive increase of the nervous system and the differentiation of its parts—is constantly furnishing new forms of pleasure and pain, which become fused with the pleasure or pain of the whole organic unit, which is itself in constant evolution.

The fundamental law is that every stimulus that operates upon us modifies the *ego* in the sense of pleasure or of pain, according as it furnishes elements that can be assimilated and are favourable to the existence of the psycho-organic unity or elements that tend to its disintegration and are hurtful to it. In general terms, pain may be interpreted as an interference with the process of nutrition, and pleasure as an elevated power of nutrition in the organ (Mead, 'A Theory of Emotions from the Physiological Standpoint,' *Amer. Journ. of Psych.*, 1893-1895). This corresponds with the hypothesis of Gilmann, according to which the source of all pleasure is the renewal, on the part of the nerves, of the activity that has already become familiar to them, while pain has its source in the violation of nervous habitude.

In the more highly evolved grades, harmony and good adaptation denote the line of pleasure, whilst disharmony and faulty adaptation are the origin of pain. This had already been noted by Aristotle, Hobbes, Kant, and Schopenhauer. Adaptation is a form of penetration of the organism into its environment, and is therefore favourable to development.

In their essence pleasure and pain are intimately related with the facility or the difficulty of the psycho-physical (biological) pro-

cesses, of whatever grade these may be. The pain produced by fatigue, which we have all experienced, and which has been specially treated by Hermann and Funke, arises from difficulty in the psychic and reactionary processes. Ferè has noted the rise of a secret and mystic sense of things related to the loss of muscular power ('*Pessimisme et impuissance*,' *Revue Philosoph.*, 1886).

Effective working of the psychic functions is a cause of pleasure, just as an obstacle to these functions is a cause of pain (Meynert and Gilmann). The rapid representation of things is a source of pleasure, while retardation of memory is a cause of pain.

Wherever there is internal motion or exteriorization in response to the needs of life, there is pleasure. An obstacle is the beginning of pain. A need, an inclination, and a tendency always imply a motor innervation of some degree or other (Ribot), and this motor innervation is pleasurable or painful according as the movement is actually effected or is hindered. Hunger, which awakens a desire, is a pleasurable sensation if it can be satisfied, for many people suffer pain from want of appetite, though they have the means to satisfy it; but it becomes a painful sensation when there is any obstacle whatever to its satisfaction. The same physiological condition will appear in consciousness as painful or pleasurable, according to the representation accompanying these tendencies.

The general character of all forms of pain is that they are intolerable—that is to say, they generate disquiet and rebellion on the part of the body, with a tendency to flee from the cause of pain, and to remove everything that irritates or afflicts us, where the nature of things permits of this. In this fact (the aversions of L. Miller) we recognise the reflex motor mechanism, or, in other words, the reaction, which assumes as many forms and grades as there are aversions.

According to some authors, pleasure and pain are bound together with a higher order of psychic phenomena, and they are interpreted by Wundt and by Ward as attention to the proper object. Every stimulus that fails to excite some degree of attention remains indifferent, and if attention is awakened, one of two things happens: either attention is exercised with full liberty, without impediment, and then we have pleasure; or attention is disturbed by the consciousness of inhibition, as, for example, in the case of fixed ideas, and we have then a feeling of pain.

Sidney E. Mezes completes this concept of Wundt, and defines the limit of pleasure as attention without obstruction or difficulty, while pain is attention with obstruction. All states of intense attention, resolving itself into vigorous thought or efficacious work, are pleasurable, while all states of internal conflict, hesitation, and practical difficulty, with coexisting inefficient impulses, are painful.

Miller brings up an ancient theory, according to which desire

is a primary fact, and pleasure and pain are secondary. He holds desire to be the fundamental and primary fact, inasmuch as it gives rise to movements of attraction or repulsion, in which lies the essence of pleasure and pain. According to this theory, the law of the reflex would be inverted, as if pleasure came from the completed movement or from the tendency to movement, which may also coincide with inefficacious desire.

We might adopt the hypothesis of Marshall, that pleasure is experienced when physical activity, coincident with the psychic state that is connected with pleasure, involves the use of an excess of accumulated force, the potential of which, resolved into actual energy, exceeds what the stimulus habitually demands; whilst the psychic state connected with pain arises when the potential of the resolved energy, owing to the deficient nutrition of the organs from which it emanates, is inferior to what the stimulus habitually demands. Pleasure and pain would therefore be primary qualities, psychic states determined by the relations between the activity and the capacity of the organs of consciousness.

Other physiologists and psychologists have adopted the idea of Herbert Spencer, that pleasure is a concomitant of all medium activity. Wundt also says that in every sensory domain excitations of moderate intensity are accompanied by the feeling of pleasure, and this is confirmed by the fact already adduced by Ribot that excessive pleasure, or pleasure that is too prolonged, is very often transformed into its contrary. What is best for the nerves, says Richet, is a moderate excitation, bringing all their activity into play without giving rise to fatigue (*Revue Scientifique*, 1896).

It is useful, however, to draw a distinction between what produces pain and what is simply *not pleasure*. The latter condition may also refer to something that is expected (with prevalence of the mnesic phenomenon). Further, there are sensations that are not pleasurable, and yet are not true pains, such as the flavour of beer and the painful states arising from unsatisfied appetite, in so far as the psychic correlative—that is, the experience formed in a precedent state, and carried to a high degree of tension by repeated efforts—translates itself into an impeded psycho-physical function. On the other hand, the facilitated functioning into which the appetite is resolved restores equilibrium to, or levels down, the psycho-physical tension, and in that consists the pleasure of satisfaction.

Several psychologists, among the most modern of them Külpe, Marshall, Calkins, admit the existence of experiences of indifference—that is to say, experiences without any emotion, either pleasurable or painful. An object remains always of one and the same form or colour, but it is not always either pleasurable or painful. Further, frequently-repeated stimuli become indifferent, unless they

are very strong. At the utmost, we may speak of very low or infinitesimal degrees of pleasure and pain, giving certain categories of sensations and representations that assume the character of indifference, most often due to habit; but, for my part, I am of opinion that in all psychic facts of perception and representation there exists an emotional element that is pleasurable or painful.

It is certain that all the theories of pleasure and pain will not fully satisfy the reader, because the nature of the subject has hitherto prevented any experimental proof; and as the phenomenon is of an altogether subjective character, it is no wonder that individual writers have not considered all the sides of this complex phenomenon.

As regards pain three hypotheses have been offered. According to the first, pain is a something connected with sensation; the second makes pain a distinct sensation; and the third considers pain as simply a degree of sensation.

As we must consider psychic pain to be of the same nature as physical pain, we shall have to adopt some theory of psychic pain that is similar to the theory adopted to explain physical pain. If we cannot show that it has a particular and specialized anatomical basis—and up till now this has not been proved—we must agree that in the mental field pleasure and pain are to be considered as phenomena determined by the facility of the interchange of components of consciousness at the time of action; determined, further, by the nutritive state of the organs, and therefore of the kinæsthesia.

The question of the psychology of pain is connected with the other question of the existence of special nerves for pain; in other words, do there exist special nerves for pleasure and pain? This point has been passionately debated by Wundt, Hofding, Külpe, Sully, Bradley, Marshall, Strong, Hoppeneimer, Soury, and many others. Some find an argument in favour of the existence of special nerves for pain in the fact that disease brings about the dissociation of the painful phenomena from the tactile and thermic phenomena.

It is known that sensibility to pain can be suppressed, and tactile sensibility preserved. This is seen under the action of cocaine, ether, chloroform; in *tabes dorsalis*, in hysteria, hypnotism, etc. There may be painful sensations of heat and cold with the absence of tactile sensibility, or slight tactile sensations may produce pain, while even intense thermic stimuli of heat and cold pass unnoticed. These facts would lead us to conclude for the existence of distinct forms of painful sensibility to heat, cold, and tactile stimuli. On the other hand, it is known that mere intensification of the degree of stimulation to a certain point becomes painful.

Wundt has attempted to conciliate the contradictions between the facts mentioned, by the hypothesis that in the peripheral nerves the paths are the same for painful excitations and for others; in

the medulla, tactile sensations and those of heat and cold pass through the white substance, while painful excitations, which are a simple modality of the preceding, resulting from a sum of stimuli, would appear to be propagated through both the white and the gray matter.

On the other hand, Nichols has observed that in some cases, pathological and normal, pain may be experienced without the simultaneous sensation of touch, heat or cold, so that if the pain corresponding to an excess of current were propagated in the gray matter, the other part of the current that must pass through the white columns would have to give the tactile sensation, and that does not happen. In my opinion this argument also is very weak, and does not impair the doctrine of intensity in relation to pain. Pain is always the cry of alarm of the threatened life of the nervous element, and its propagation through collateral paths such as those passing through the gray spinal matter, is due only to the increased tension in the ordinary paths. The painful sensation, owing to its intensity, does not permit of the perception of tactile impressions, which are added to the painful ones, and masked by them in consciousness.

Richet and Landois consider pain to be the effect of the intensity of the stimulus. Pain may be provoked either by an intense excitation or by a sum of weak excitations (Richet). As physical pain is connected with the diminution and disorganization of the vital functions, so moral pain may be interpreted as the effect of intense stimuli, or of a sum of stimuli, acting upon the psychic personality. It is psychic, and the factors that produce it are psychic, with or without a state of psychic hyperæsthesia. Like somatic pain, it has no special paths or special centres. All the theories that tend to localize pleasure and pain, and the emotions generally, break down in face of the difficulty of proof.

Mann's hypothesis (*'Klinische u. anatomische Beiträge zur Lehre von der spinalen Hemiplegie,' Deutsche Zeitsch. f. Nervenheilkunde*, 1896), which excludes the probability of the existence of two paths in the spinal medulla—one for painful and thermic sensations, and the other for tactile sensations—but admits that tactile sensations possess a path of summation besides the direct path, and that pain is only a symptom of this phenomenon of summation, overthrows the other theory of Frey (*'Untersuchungen über die Sinnesfunktionen der menschlichen Haut,' Gesellsch. der Wiss.* Bd. xxiii., 1896), who holds that the sense of pain possesses terminal apparatus and specific nerves analogous to the other sensory nervous apparatus and conductors. This last hypothesis takes no account of the researches of Adam Giagliniski, which have brought to light a long bundle passing across the gray matter between the fore-part of the posterior columns and the central canal, in the neighbourhood of the posterior commissural fibres, and intended probably for

the transmission of painful sensations ; nor does it make use of the seductive hypothesis of Nichols, who assumes that the nerves of pain have the task of replying to excessive stimulus, as a defence against violent and offensive influences, the ordinary nerves ceasing to functionate when the stimulus is intense. I prefer to adhere to my old opinion (*Semiotica delle malattie del sistema nervoso*, 1889), which is held also by others, including Soury, who, in '*Le Système nerveux central*,' Paris, 1899, vigorously defends the doctrine which attributes to pain neither specific quality of sense, specific centre, nor special nerve-paths.

It is known that tactile sensation becomes sensation of pressure, and then painful sensation ; the thermic sensations of heat and cold become painful only as their thermic degree is more or less increased (the physiological threshold of this pain is well known). The higher special senses may also furnish painful sensations when the specific stimuli exceed a determined limit of excitation. An intense light and a very loud noise are painful.

Goldscheider, who is here followed by Luckey, proposes to distinguish three grades of pain. The first grade is represented by localized physical pain ; the second by undefined pains or painful sensations, such as discomfort in the stomach, cephalæa, etc. ; and the third by psychic pain, which is found in a morbid degree in melancholia and similar states.

The general law of the origin of pain is therefore to be stated as the sum of stimuli tending either to destroy the nerve-element or to disintegrate it more than is necessary to overcome the obstacle. This law adapts itself with very great probability to all forms of pain.

The evidence of the physical phenomena accompanying and giving expression to emotion cannot be considered as evidence of the seat of the psychic pain, just as the muscular phenomena following titillation do not prove that their centre is also that of the particular sensation that excites them.

It is worthy of note that in states of pleasure and of pain there are always important modifications of the circulation and respiration. Now, the fact that these two functions have a cortical centre (see Part I. of this work) in the region of the somæsthetic zone, and other subcortical centres, does not authorize anyone to consider that zone or the subcortical centres as centres of the emotions. At the utmost they may be considered as the anatomical base of the kinæsthetic sense, and we have already said that kinæsthesia is a constant component of all emotions. On the other hand, Flechsig thought that all emotions and passions accompanied by disturbance of the circulation and the respiration must have their origin and their seat in the tactile zone of the cerebral mantle, which, in his opinion, is also the cortical centre of the feelings that become conscious.

Kirchhoff also subscribes to this theory with slight modifications

(*'Neuere Ansichten über örtlichen Grundlagen geistiger Störungen,'* Halle, 1896). He limits the area of painful sensations still further, confining it to that tract of the gyrus fornicatus which, lying on the internal aspect of the hemisphere, is included by Flechsig in the circumference of the somæsthetic zone. To this zone he considers that painful sensations are irradiated, especially through the corona radiata of the optic thalamus, which is the centre of the imitative movements of pleasure and pain, and would appear to be the centre at which the spinal waves are transformed into painful waves, the latter becoming conscious in the gyrus fornicatus, from which they are propagated through the whole mantle—the organ of thought.

If, on the one hand, the somæsthetic zone contains cells that give rise to motor fibres for the voluntary muscles, as has been proved by numerous experimental and histological researches, on the other hand it has cells whose axis-cylinder prolongations directly or indirectly reach the muscles of respiration and the circulatory apparatus; also others to which there come fibres transmitting the sensations that arise from disturbance of the mechanism of the circulation and of the other parts and functions of the organism. It is there that hunger, thirst, and sexual wants come into consciousness, and it is in this sphere that the disposition of the mind is moulded in the kinæsthetic consciousness. This would justify the affirmation of Flechsig that the tactile sphere is the central focus of the emotions and passions.

According to Flechsig and Kirchhoff, emotional and passional states are transmitted from the tactile zone to the periphery by means of the optic thalamus, and especially to the dorso-median nucleus, which has a great number of connections with the tactile zone.*

* M. Calkins has attempted to formulate a theory of the localization of pleasure and pain. I think it best to repeat here the words of the authoress (*'An Introduction to Psychology,'* New York, 1901): 'Pleasure and pain are given by the excitation of the cells of the frontal lobes, when they are reintegrated or fatigued. The excitation is transmitted to the frontal lobe by fibres coming from the motor cells of the Rolandic zone. When the cells of the frontal lobes are well nourished and not fatigued—that is, in a state of anabolism—they react more than adequately to the excitation that is transmitted to them from the Rolandic zone, and there is pleasure. On the other hand, when the cells of the frontal lobes are ill-nourished and exhausted—that is, in a state of katabolism—they react inadequately to the excitation arriving from the Rolandic zone, and there is pain. Lastly, if the activity of the cells of the frontal lobes corresponds exactly to that of the excitation, the experience will be neither pleasurable nor painful—that is to say, it will be indifferent.'

Kitchener attributes the emotions of pleasure and pain not solely to the nutritive condition of the frontal lobe, but to the general effects produced by any stimulus upon the whole nervous system.

As a rule this effect is translated either into a process of reintegration (anabolism) or into one of disintegration (katabolism).

But, in the first place, what is emotion? Emotion is a state of consciousness concomitant with those instinctive reflex and co-ordinated phenomena that arise from the perception or the representation of definite objects, and that contain the elements of integration or disintegration of the organism, taken in the fullest sense of the word, both physical and psychical. The two primordial forms of emotion are pleasure—which is connected with all that integrates or increases the organism, physical and mental—and pain—connected with all that tends to disintegrate or diminish it.

Whilst the cast of mind has its roots in the kinæsthetic sense, and is good or bad according as all the parts of the organism perform their function harmoniously, or not, emotion arises from some fact or other that destroys the kinæsthetic equilibrium, and tends to diminish or to increase the psychic personality, to aid or to resist some of its tendencies or its intellectual or affective components.

Somatic concomitants of pleasure are—increase of the circulation in the head without a corresponding increase of the arterial pressure (according to Meynert, who admits vascular dilatation with diminished arterial pressure), volumetric dilatation of the peripheral organs (Lehmann, *Die Hauptgesetze des menschlichen Gefühlslebens*, Leipzig, 1892), increase of the pulse, acceleration of the heart's action, radiant visage (or, as commonly expressed, face glowing with joy), increased power of sensation, rapidity and energy of movements, increased depth of inspiration, with accelerated respiratory rhythm and increase of muscular power. Pleasure is dynamogenetic (Ferè, *Sensation et Mouvement*, Paris, 1887).

Somatic concomitants of pain are—diminution of the diameter of the vessels, through contraction of the vascular walls; pallor of the skin, owing to ischæmia; diminution of certain secretions, the mouth becoming dry and the milk disappearing, and the increase of certain other secretions, such as tears; constriction of the pulmonary vessels, giving rise to that sense of oppression noticed by all who are under the tyranny of pain; feeling of cold; want of tone in the voluntary muscles, whence the head bowed down ('bent with sorrow,' as Lange says), the face lengthened, and the lower jaw slightly drooping; weakness of the voice; increased size of

Another theory of localization is that of Münsterberg, who offers the hypothesis that the innervation of the cells and of the fibres connected with the extensor muscles produces pleasure, while the excitation of the cells and the fibres connected with the flexor muscles gives the emotion of pain. For my part, I cannot enter into a long discussion with regard to these theories of localization, and I cannot agree with any hypothesis that tends to localize the emotions. After what I have said about the functions of the frontal lobe in the first part of this work, I must conclude here that these theories are all more or less premature.

the eyes, with wider opening of the palpebral fissures. Pain is paralyzing.

The impossibility of separating mental representations from the somatic concomitants of emotion has given rise to two opposite theories about the nature and the seat of the emotions.

According to one theory, emotion consists in a psychic phenomenon determined by perceptions or by ideas, accompanied by a number of somatic phenomena—vaso-motor, muscular, secretory, respiratory, all of which are consecutive and reflex. According to the other theory, emotion is constituted essentially of vaso-motor, respiratory, and general somatic phenomena, which follow immediately upon perception or representation, so that the change in all these functions, transmitted to consciousness, gives rise to emotion. In this view emotion is only the consciousness of muscular and neuro-vascular variations. The names of James, Lange, Sergi, Pitres and Regis, Soury, Külpe, Mercier, Calkins, Irons, Baldwin, Dewey, and many others, are connected with this disputed question.

Here is what James says: 'Our natural way of thinking about these coarser emotions is that the mental perception of some fact excites the mental affection called the emotion, and that this latter state of mind gives rise to the bodily expression. My theory, on the contrary, is that *the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur is the emotion*. Common-sense says: we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble because we are sorry, angry, or fearful, as the case may be. Without the bodily states following on the perception, the latter would be purely cognitive in form, pale, colourless, destitute of emotional warmth. We might then see the bear and judge it best to run, receive the insult and deem it right to strike, but we should not actually feel afraid or angry.'

Further on he continues: 'If we fancy some strong emotion, and then try to abstract from our consciousness of it all the feelings of its bodily symptoms, we find we have nothing left behind, no "mind stuff" out of which the emotion can be constituted, and that a cold and neutral state of intellectual perception is all that remains. . . . I cannot help thinking that all who rightly apprehend this problem will agree with the proposition above laid down. What kind of emotion of fear would be left if the feeling neither of quickened heart-beats nor of shallow breathing, neither of

trembling lips nor of weakened limbs, neither of goose-flesh nor of visceral stirrings, were present, it is quite impossible for me to think. Can one fancy the state of rage and picture no ebullition in the chest, no flushing of the face, no dilatation of the nostrils, no clenching of the teeth, no impulse to vigorous action, but in their stead limp muscles, calm breathing, and a placid face ?'

Irons, Baldwin, and Dewey have ranged themselves against the theory of James-Lange. The dispute has been animated and supported by a number of arguments *pro* and *con*, but these have rather displayed the polemic power of James than made clear the value of the two theories.

Within the restricted limits of this work it is impossible for us to enter into the details of the discussion, and much experimental research will still be required before we can decisively accept either one or other of the theories. If once we could demonstrate that vaso-motor phenomena, like those that form the chief characteristic of emotion, exist apart from that particular psychic state which is for some the specific fact of the emotions of pleasure and pain, whatever be their forms, the vaso-motor theory of emotion would disappear definitively and irreparably. When we consider the state of mind in a number of vaso-motor disturbances of longer or shorter duration, finding there nothing, or almost nothing, in the nature of true emotional states, we feel great distrust of the somatic theory. In hysteria we frequently observe cutaneous ischæmia, palpitation of the heart, and respiratory anxiety, while the subject is utterly indifferent. In Basedow's disease we find a great increase of the cutaneous circulation, redness of the skin, clear and sparkling eyes, and, instead of joy or anger, a sense of anguish and of fear accompanies those somatic phenomena. Hysterical women with anæsthetic skins, ischæmia, and paralysis of a great number of their muscles, are very far from showing signs of sadness. Men afflicted with polyneuritis, with complete paralysis and muscular flaccidity, sometimes with disappearance of all the muscular masses, are for whole days in excellent humour, if only they are allowed to hope for recovery. In the midst of so many contradictions, the mind remains perplexed and resists the seduction of the organic theory, even when the experimental habit inclines one to favour the doctrine that is based upon objective and demonstrable facts.

It is certain that between the first psychic fact and the last fact of emotion there exist links that follow one upon another in consciousness, in the form of rapid reasonings and fantastic representations, in which the end always is that the *ego* appears to be compromised or is exalted. This fact has been noticed by James, who did not say, 'We are terrified because we flee or because we tremble,' as the critics have made him and Lange say. What he said was simply, 'We see an object, we tremble and are terrified.'

Evidently James makes a number of psychic components or representations enter into the vision of the object, and these end in compromise or exaltation of the personality ; but the trembling is placed before the terror, which proves how he holds the genesis of the terror to be due to the resonance of the trembling in a consciousness filled with the image of the object.

In my opinion the weak point of this doctrine lies in the fact that it is sought to attribute to the somatic phenomenon a high significance in the origin of the emotion, whilst in the consciousness that is perturbed there always *coexist* two facts—the representation, along with the internal participation of the *ego* itself, and the somatic fact. Now, no one can think that the somatic is the more important of the two components co-existing in consciousness, because, while we may not infrequently observe, where no emotion exists, somatic disturbances analogous to those noticed in emotion, we have no example of a psychic fact compromising or exalting the *ego* without being accompanied by emotion either of pleasure or of pain.

Dewey has advanced a theory inclining to that of James, but essentially Darwinistic. According to that writer, the expressions of emotion are in reality the reduction of movements, primarily useful, to habits. These are only survivals or modifications of teleological co-ordinations. Here we meet with a conflict between instinctive movements and new movements determined by ideas, and from this conflict arises a sensation of tension, which is the basis of emotion. If there is no conflict, there is no emotion.

Stratton calls attention to the point that if, when under emotion, we direct our attention to the organic sensations accompanying the emotion, the latter ceases, although the sensations continue.

Ferrero introduces the vital tone of an individual into the conception of emotion. He deduces this from the fact that a normal man in perfect health is not troubled at the thought of death. Owing to the uncertainty of the period of its happening, there is no feeling of dread, and for this reason sailors and miners, who are constantly risking their lives, have no fear of death, while old and weak persons think of it and fear it because the organic sensation of the weakness of their bodies is in harmony with the idea of death.

All these are but secondary aspects under which we may examine the biological problem of emotion, and it will easily be understood how, in the light thrown upon it from this manner of examination, the doctrine of James-Lange appears in all its importance to be inverting the whole problem of the essence and origin of the emotions.

The favourable acceptance of such a hypothesis is due to the fact that we cannot demonstrate a subjective state of emotion dissociated from the somatic phenomena, whilst only these latter

phenomena can be put to experimental proof, and the modern scientific spirit attributes value only to such facts as it can control, estimate, and measure objectively. I cannot get away from the conviction that the psychic components of emotion are quite as important. Among these the greatest attention is due to *surprise*, in a large number of emotions. If a soldier on the march comes in sight of the enemy, and is assailed by fear of death, and of the pain of rapidly imagined wounds, or if a girl is terrified on seeing a snake close to her feet as she walks along a country path, the fear and the terror in these cases are the effects of the surprise, which interrupts the normal course of the representations and the feelings, substituting for them in consciousness others that have a disintegrating power. It is the *imminent* threat against the integrity of one's own physical and psychic personality that determines that complex psycho-physical state which we call fear.

If the girl sees the serpent from afar, and is not threatened, or if the soldier has already seen the enemy several times, so that there is no surprise, and the danger appears less imminent, or even should it be imminent, if the consciousness has previously been occupied by those images and by the dangers to which the personality has been habituated for some time ; if there is adaptation of the consciousness to the new order of images—as happens in the case of miners and sailors—fear is absent, and emotion does not enter into the habitual state of the mind and into the renewed direction of the consciousness. This appears to me to prove that the organic reflexes, respiratory, muscular, and vaso-motor, do not follow immediately on the representation or the perception, and that fear does not arise from those organic modifications, but is the effect of surprise, which for the moment disintegrates or threatens the psychic personality, and it is this new state that is reflected in all the organic functions. Between perception or representation and the organic phenomena of emotion there exists a complex psychic factor, which in its essence can be reduced to the threat of disintegration, to interdiction, or to the instantaneous exaltation of the personality.

If a man striving for a fortune acquires it gradually, he will not have any emotion of joy. His consciousness gradually integrates itself with the image of the million, and his internal satisfaction becomes a feature, a permanent attribute, of the progressive adaptation of his personality to the new conditions of existence. Such internal satisfaction is not an emotion, it is a state.

If, on the other hand, even a modest fortune should come to him suddenly, as, for example, the winning of a prize in a lottery, his joy would be so intense that he would run the risk of a congestive attack or of cerebral apoplexy. In this case it is the surprise that breaks up the habit of the consciousness and determines the emotion. Two factors—the person and the fortune—are the same ; the third

—the duration or the repetition of the representation that creates the habit of consciousness—is variable. I can picture this phenomenon to myself in many cases as the reversing, at full speed, of the whole machinery of the cerebral waves, after they have acquired motion in a certain direction. I think it is very necessary that the dynamic exponent should be introduced into any plausible theory of emotion. I believe that high nervous tension, produced by the surprise that interrupts the normal course of thought, while it interdicts the higher centres (reasoning and attention), discharges itself upon the lower organic centres, and determines the reflex organic phenomena of emotion. Let us eliminate surprise, give free course to thought, and direct our attention to the sensation that has produced the emotion, and, as Stratton has observed, the emotion ceases. In other cases, as in the emotion of the orator, which is prepared, or that of the traveller who passes along deserted ways by night, the compromised *ego*, in conflict with the feelings and impulses that determine him to speak or to travel, places itself voluntarily in the circumstances occasioning the emotion. If the orator were sure of himself, and of the opinion that others would express about him, and if he did not contemplate the possibility of compromising some of the components of his personality, his self-esteem or his vanity, then he would not be perturbed, just as the traveller would not be perturbed if he did not know that he was exposed to danger. In this case the pain or fear arises from the contrast between the tendency of the *ego* to affirm itself and the danger of an opposite result, which would mean the disintegration or the diminution of the personality.

In ereutophobia, or the fear of blushing, the principal and preponderating element is the idea of blushing. It is this that determines and provokes the emotion (Pitres and Regis). It is clear that such an emotional state cannot be related solely to the changes in the physiognomy, in the circulation, and in the muscular tone, any more than it can be solely related to the totality of the psychic representations that provoke it. The fact is that phenomena of vascular constriction or vascular dilatation are observed in many weak individuals, especially girls, without, however, their noticing all those modifications that the emotion brings into consciousness. The young person who suffers from ereutophobia has been for some time subject to reddening of the face and rush of blood to the head, but she has no fear of blushing. This begins on some occasion when the subject sees herself, and imagines that others are noticing the blush, and indulging in suspicions as to the cause of it.

A further proof of the weakness of the somatic theory of the emotions is afforded by those who suffer from hemiplegia due to a lesion so situated that it withdraws the thalamus opticus from the inhibiting influence of certain parts of the cerebral mantle. In

such cases, as also in cases of extensive cortical lesions, the sufferers display great emotivity. They weep, laugh, cry out on receiving the slightest impression; yet it is evident that there is no true emotion, only the semblance of it. The weeping and the laughter of these sufferers are only simulacra of the real emotions, and if there is any emotional resonance of these in the consciousness, it is to be attributed to old and repeated associations between these somatic phenomena and the respective emotive states.

In the ordinary chorea of Sydenham, and also in other serious forms of the malady, when the muscles of the face are involved in the anarchy of the muscles of the trunk and limbs, the physiognomy assumes the strangest expressions of hate, anger, menace, pain, or joy, while the mind gives no evidence, through corresponding commotion, of sharing in the emotion expressed by the physiognomy. I add no further examples, for I believe that these are sufficient to lead to the conviction that, until it is demonstrated that the expression of the physiognomy, the vaso-motor changes, and the alterations in the secretions and the respiration are indissolubly bound up with determinate motions or attitudes of mind, and until we can prove that one and the same emotional state of mind corresponds with one attitude and one vascular condition, it is impossible for us to recognise in the somatic theory of the emotions that objective quality of demonstration which supports a theory and secures for it the victory over others.

It has not escaped the notice of Lange that abundant secretion of tears, red and swollen face, reddened eyes, increased secretion of the nasal mucus—all symptoms denoting great dilatation of the vessels of the skin and mucous membranes about the face—coincide with pain; but, in support of his theory, he supposes that these phenomena are consecutive, of the nature of a reaction against the primary constriction—a relaxation of the muscles of the small arteries after strong constriction. He leaves unproved, however, the very fact asserted—that pain and anguish are always accompanied by vascular constriction, even if it be of short duration.

Now, if that is contrary to what is commonly observed, if there exists a number of states of pain and fear that are accompanied from their beginning by vascular dilatation of the skin, if, indeed, the sentence of Descartes quoted by Lange himself be true, ‘*Lacrimæ non promanent ab extrema tristitia, sed solum a mediocri*,’ what would be left of the theory of James-Lange to render it more positive than the others?

For a long time we have been acquainted with the researches of Claude Bernard into the influence of pain on the heart and circulation. This is explained by the direct action of painful stimuli on the bulb. Frogs from which all the brain above the bulb has been removed, so that they cannot feel pain, which is a phenomenon of consciousness, nevertheless show the organic symptoms of pain

—lowering of arterial pressure, and even stoppage of the heart's action—on compression of the sciatic nerve (C. Bernard, Richet, F. Frank). The somatic phenomena are therefore separable from the conscious phenomenon of emotion in so far as they may exist apart from the conscious fact of emotion, and therefore it may be admitted that it is not the somæsthetic zone that is the centre of their origin, but the medulla oblongata.

The truth is that there does not exist any strict connection between a form of emotion and a complexus of somatic phenomena.

The few experiments hitherto made upon the organic effects of agreeable and disagreeable stimuli by Anngell and Simon F. Lennan ('The Organic Effects of Agreeable and Disagreeable Stimuli,' *Psychological Review*, New York, 1896), and by Binet and Courtier, do not strengthen the theory of James-Lange. If it is true that disagreeable stimuli produce a lowering of the level of the tracing in 90 per cent. of cases, the same proportion in the other direction does not follow upon agreeable stimuli, for in many cases there is a lowering extending for several seconds when these begin to act.

Mantegazza, who undeniably is a keen observer, remarks in the 'Physiology of Pleasure and Pain' that strong painful stimuli sometimes reduce the heart's action and sometimes increase it, whilst the respiration is at times more frequent and shallow, at others slower and deeper. This statement holds good in the case of the movements that an animal makes under certain conditions that are painful—as in flight, for example. It is also true that these movements are, as it were, spasmodic, in one sole direction, and debilitating, as has been observed by Ribot (*Psychologie des Sentiments*, 1890), and that in its ultimate analysis pain is accompanied by diminution of muscular energy. Yet it is indisputable that the conscious fact of pain or of fear sometimes coincides with phenomena of an opposite nature to those upon which it has been said to depend.

The assertion of Münsterberg that agreeable stimuli produce movements of extension and disagreeable stimuli movements of flexion has been only partly confirmed by the experiments of Dearbon and Spindler ('Involuntary Motor Reaction to Pleasant and Unpleasant Stimuli,' *Psychological Review*, 1897). These authors have found that the reaction varies according to the nature of the individuals and their temperaments, some making many movements of extension and others many flexions, whether the stimulus be pleasant or unpleasant. Under the influence of painful stimuli the flexions are 66.6 per cent., and the extensions 33.3 per cent. On the other hand, under agreeable stimuli the extensions are 67.8 per cent., and the flexions 32.2 per cent.

We may compare the somatic phenomena of emotion to the language through which thought is expressed. Language is the

physical component of thought, just as the somatic phenomena described are the physical components of emotion. If an individual who suffers from aphasia due to a lesion of Broca's centre, or of the first temporal convolution, does not express or formulate thoughts because he lacks the physical component indispensable to their formation and extrinsication, no one will think that thought is language, and that the anatomical base of language is the same as that of thought. If we adopt the formula preferred by the upholders of the somatic theory of emotion, we shall have to say: 'I see such a thing; I name it, therefore I perceive it.' 'I represent to myself certain images; these are reflected on the centres of speech, which furnishes me with the notion of things.' I believe that such reasoning as this will not be adopted by any psychologist.

In some cases—for example, degenerates—emotions of joy are expressed by mimicry of weeping. A lady mentioned by Sikorsky used to smile in such a way that it was always uncertain whether she were laughing or weeping. She had no other power of mimicry. In progressive paralysis (Schüle) and in hallucinatory paranoia (Sikorsky) we often find the so-called indifferent mimicry in various states of emotion.

After this long discussion it seems to me superfluous to devote many words to the theory of Sergi, which does not substantially differ from that of James-Lange.

Lange distinguishes the group of emotions from the group of passions and feelings. It is impossible to agree with this distinction of Lange's in so far as regards the actual essence of the two groups that he has separated, especially if it be remembered that he has been led to make this distinction by the necessity of maintaining his theory of emotion. He says: 'It is incontestable that sadness, joy, fear, anger, and other similar states, constitute a group of phenomena distinct from love, hatred, contempt, and admiration, and it is necessary to separate them from the point of view of psychology. It is only to the first group that I apply the term emotion; the other states are passions, feelings, or whatever one chooses to call them. . . . As a matter of fact, it is absolutely necessary for anyone who takes up the physiology of these phenomena to distinguish them as far as possible. We cannot assimilate things so different as terror, fury, joy, envy, love, and the passion for liberty. The difference between these two groups does not consist solely in the greater complexity of the last-named states, which are composed of psychic elements so heterogeneous that even reflection has a share in their formation, but also in the complexity and heterogeneity of their efficient conditions' (Lange, *Les Émotions, Étude Psycho-physiologique*, translated by Dumas).

That is exactly what has to be proved. On the one hand, everything induces us to believe that the second states represent only an

advanced degree of the first. The greater advance in evolution means that new components have been united to, and assimilated with, the first, but that does not change their proper nature or their origin. The same thing happens with emotion as with ideas. If, from the simple images of herbs, fruits, and flesh with which we satisfy the sense of hunger and sustain ourselves, we have come to form the concept of food in association with that of preservation—perhaps it may be through the intervention of reflection, although this is very doubtful—that does not establish essential differences between separate foods and food in general.

So also the brute satisfaction of hunger and of the sexual appetite is gradually transformed into the sentiment of the duty of working, into which there enter as components all the pleasures that arise from difficulties overcome, and from the successful extrinsication of our increasing activity, as well as all those that come from the labour of others and from the beneficent current of solidarity that smooths away so many troubles in life, and brings so much comfort.

These new components, through which the primitive movements for securing food have been transformed into others much more complex, co-ordinated, and varied, do not transform the proper emotional nature of these states. More complex representations, new desires, new motor tendencies, and new aspirations, are always at the bottom of our struggle for pleasure and our struggle against pain. On the other hand, with the suppression of many of the old motor tendencies, the appetite, and the mode of satisfying it, have been complicated, but not changed in nature. Thus, through continuous grafting of emotional and intellectual components, the old feeling of hunger, that formerly excited simple reflexes, has given place to the elevated sentiment of the duty of labour, which in its turn generates reflexes of extreme complication in its endeavour to secure greater comfort in life.

In this progressive formation of emotional syntheses we always find an increasing loss of organic concomitants of the primitive emotion, and successive assimilation of the emotions of the social environment, also of intellectual components.

The evolution of feeling can take place only through the grafting on to the fundamental feeling of the body, or kinæsthetic sense, of all the emotional qualities of the sensations that give us our notions. It is always the fundamental feeling of the organic *ego* that is modified agreeably or disagreeably, and is incremented by all the affective qualities of the sensations, giving rise to two other sides of the *ego*, the spiritual and the social (James).

Sentiments, therefore, like ideas, are evolved, and every stage of intellect is a stage of sentiment.

On the other hand, a group of intellectual representations always coincides with the sentiment, so that emotional states

come to be associated in varying proportion with ideative elements in consciousness.

If we agree upon the fact that all notions have an emotional exponent, and all states of emotion are associated with ideative representations, we shall understand how, in proportion as the ideas are increased and thought evolved, the affective complexity progresses, the two series of products accumulating and constituting the intellectual and emotional patrimony of the personality.

In the sentiment of love we have an instance of those sentiments that show a gradual process of evolution, so that from being simple they have become complex. The feeling of love had its first beginnings in the simple emotion of touch, and it has advanced by assimilating to itself a number of psychic components that include even the highest expressions of idealism. In a fully-evolved man it is represented not only by tactile and kinæsthetic commotion, but also by an aural element, the voice and speech, and by a visual æsthetic element, resulting from harmony of form. It is complicated by the pleasure of possession, of strength, of generosity in protection, of reciprocal comfort, of vanity, all of which sentiments are fused in that complex which we call by the abstract name of love.

The religious sentiment is also at first simply a complication of the fundamental sentiment in a synthesis of pleasures and pains, proximate and remote, with which are associated intellectual components—images, judgments, and beliefs. Through it the individual who believes in a Supreme Being denies himself present pleasures, either in the hope of attaining future pleasure or from fear of future punishment that will be of much longer duration and more intense.

The religious sentiment, however, is beneficial to the community, and exercises great inhibitive and educative power, in the sense of restraining individual tendencies in the interest of the community. The first laws were religious, and their purpose was to restrain the satisfaction of individual instincts.

If it be true that some men feel that the religious emotion has almost spent itself, and that its place has been taken by another feeling which is summed up in respect for social tendencies and impulses, it evidently proves that the religious sentiment represents a stage in the moral evolution of society, and tends to be replaced by the feeling of duty.

The religious sentiment is the ruled line along which the moral sentiment slowly advances. This last, which is the highest expression of sentiment, the fusion of all the emotions and of all the impulses, has arisen and has become a habit of consciousness through rigid religious and legislative rules. It is destined to become a still more intrinsic component of the social consciousness now in process of evolution. The power of attention and the imagination

concur in it, and in its evolution we find the source of all the directive power of man in his social relations. Religious sentiment, however, tends always more and more to become transformed into a moral consciousness more intimately related to human nature. The testimony of men who refrain from ill-doing, not from fear of hell or because of the commandments of religion, but because of the development of the consciousness of their duty to others, their duty not to cause others pain they would not care to suffer themselves, is a sure proof of the evolution of the moral sentiment. It is in this way that morality is conceived by the positivist psychologist (Spencer, Lewes).

This conception inspires the greater number of the social laws which have been for some time occupying the minds of legislators. These have for their basis human emotional character, highly evolved in the direction of assuaging the pain of the sufferer. The law of evolution of the sentiment depends upon the fact that, from being purely egoistic in the early days of humanity, man has become egoistic-religious in successive ages, and tends to rise to the dignity of a sentiment of humanity and of duty in his social relations.

There is nothing static in the sentiments and emotions, unless in a very temporary sense. Where there is no evolution there is regular rhythm of an order of emotions in organic forms—hunger, sexual needs, etc.—but all states of consciousness, emotions, and sentiments represent a tendency and realize the concept of perpetual passage upheld by James, Bergson, and Rauh. When a falcon sights his prey, he has the pleasurable preperception of satisfying his appetite, and, by contrast, the fear that his prey may escape. With this emotional disposition of mind there is associated the tendency to combined movements directed towards the capture of the prey, and the prevention of its escape. Clearly, emotion of one type carries with it emotion of another type, and is always translated into a *tendency* to movements, which remain rudimentary or are executed according to the twofold directive of the two associated emotions. In this tendency (associated with emotion) to move towards what is pleasing, and to get away from what is painful, we may detect *desire*, which is a conscious moment of the emotion passing into action. Preperceived joy is a desire, and actual joy moves in a plane of new desires and new tendencies. As one idea brings others in its train, so one emotion is transformed into others, and the tendencies that arise from judgments and reasonings emanate only from sentiments with an intellectual content.

In the passage of certain sentiments into others we sometimes fail to notice the intermediate feelings; but here, too, as in the case of ideas, motion is perpetual.

Static emotion is always morbid. The higher sentiments

(religious and moral), which appear to be static, resolve themselves through endless paths of conduct, where they are continually meeting with new emotions. Ecstasy and obsession, which are prolonged states of joy or fear, are morbid states. The organic sentiments, which always present the same characteristics, alternate with one another in almost constant rhythm. Thus, evolution and movement of human emotions are continuous. The passage of egoism into self-sacrifice is often nothing more than the enlargement of the personality, seeking its pleasure outside of itself (Guyon, Rauh). The transformation of sensual love into mystic love bears with it the joy peculiar to each—the sensory form of the one and the æsthetic form of the other emotion. Pride gives rise to generosity or to ingratitude, based upon the ruling egoism. The depression consequent upon wounded *amour propre* generates hatred and envy. A believer, like Vaillant or Faure, may become an anarchist (Rauh, *De la méthode dans la Psychologie des Sentiments*, 1889), and a criminal may have in him the makings of a saint.

The vanity of the hysteric subject is a good soil both for the growth of rascality and for the development of enthusiasm for good causes, leading even to self-sacrifice (Legrand de Saulle, Jolly, P. Janet, and many others). Faith generates the emotion of doubt, and sometimes, in degenerates, it originates blasphemy. Ambition, love, and pity are only various forms of egoistic sentiments, with varying proportions of altruism, and of intellectual representations. On the one hand, we have in altruism the physiological fusion, in one's own consciousness, of the emotions of others—the power of feeling, through sympathy, what others feel, in the different forms and degrees of pleasure and pain; on the other hand we have the greater advantage that a man acquires through his adaptation to the demands of others.

Altruism also assumes various forms. Love, originally confined within the limits of instinct, was affected throughout the Middle Ages by the dominant mysticism, and became a passion that assumed in literature the form of romanticism; while within the last fifty years it has risen to the recognition of equality of rights as between man and woman, allowing woman to develop her mental energies in all directions, even where she comes into competition with man. In this case we may speak of new channels opened to the love of man for woman.

The same thing has been observed in the sentiment, or rather the emotion, of pity. To-day pity is no longer the giving of humiliating alms, which is the expression of individualism, but the feeling of human solidarity, which determines the collective action of society towards alleviating human suffering. At the same time, there is the evolution of the egoistic sentiment, which is at the basis of every work of charity, which reaches the dignity of a collective social defence.

If, when I pass a cripple who is incapable of earning subsistence for himself, I stretch a hand to him in charity, I am then obeying a sentiment of pity ; but at the same time I am satisfying a strong impulse of my mind, which suffers in sympathy, to free itself from the pain caused by the sight of suffering in others. Now, if many men, or even a whole society, unite in a common effort to eliminate human misery from the world, collecting in proper establishments those who are unable to work—cripples, invalids, and the poverty-stricken—and procuring for them a life that has some part in the comforts of the rich, individual egoism here becomes collective egoism, and assumes the form of social defence. Individual charity, which is emotional and insufficient, becomes collective charity—certainly less emotional than the former, but very much better fitted to attain the objects of social defence, and more efficient in procuring for invalids and cripples at least a part of those comforts that are enjoyed by the healthy and strong.

Here discussion might arise as to whether these are true emotions, for some would maintain that true emotion is particular, and never general. But if we consider emotion as an experience of the proper *self* in relation with other *selves*, or with objects, and if we attribute to emotion the content of the images to which the relationship is referable, and also memory (Ribot), we arrive at the conviction that the mechanism of generalization consists in the fusion or synthesis of individual experiences in relation to the external world—fellow-beings, animals, and things—together with an increasing degree of intellectual content. Generalization does not change the intrinsic character of the fundamental emotion of pleasure or pain. It is always based upon egoism. It is the *ego* enlarged, and with extended relations in the world. Family, fatherland, religion, humanity, enlarge the limits of one's proper *self*. Gratitude, which is one of the highest sentiments, is happiness flowing out from one's own mind towards the person on whom it depends ; it is a well-defined reflex of causality, based on pleasure.

The following is a brief description of the commonest and fundamental emotions.

We have already said what are the somatic notes of psychic pain and pleasure—sadness and joy.

Sadness is negative or positive. In its negative form we can imagine it as an obstacle to, and an arrest of, our habits and instincts, acting through representations and also through unconscious associations.

The subject becomes dejected and irresolute ; he lays aside the weapons of defence, and surrenders to the misfortune that has assailed him. I believe that no one has been more successful in describing negative sadness than Leopardi in a letter to P. Giordano. 'Were I to go mad at this moment,' he writes, 'I believe that my madness would take the form of sitting with an amazed look always

in my eyes, my mouth open, my hands between my knees, and without ever laughing, weeping, or moving from the place in which I might happen to be, unless I were forced to do so. I have no longer the strength to conceive any desire, even the desire of death—not because I fear it on any account, but because I can see no difference between death and this life, where I have nothing left to console me, not even grief.’

Positive sadness is either primary or else follows the negative phase. Its characteristic is seen in the case of the man who, struck by disaster, figures to himself all the ruin and misery it entails. Whilst this involves disorganization of his habits, there is at the same time the commencement in him of a mental effort towards repairing his loss, with new resources, new adaptations, new labour, new habits and motive tendencies towards active life, sometimes in manifest disagreement with the habits of the past, but tending to restore him, in view of the enjoyment that they promise.

Active sadness tends to disappear, being gradually driven out by new adaptations and by the pleasure derived from restorative work ; but let it become inactive or inefficacious, then active becomes confounded with negative sadness. If the difficulties to be overcome are too great for the strength, the sadness persists, and increases with fatigue. As somatic pain coincides with asthenia in the domain of physiology, so sadness is accompanied with discouragement in the domain of psychology. In passive sadness the subject abandons himself unresistingly to fate. ‘What good is there in working, hoping, planning, or taking any interest in life ?’ In active sadness, however, there is ideal and motor super-activity.

Joy, like sadness, is both positive and negative. In the positive form, as when a youth passes an examination that assures him a position, or when a candidate is elected to an office that offers him immediate pleasure and opens new fields to his talent, we have new adaptations, and a new and facile direction is given to the instincts and habits of life. A certain number of past habits are at once discarded, and new adaptations are easy as obstacles are removed. To take an example from Dumas, an individual who comes into possession of a fortune soon has preformed representations of a number of new habits, as, for example : ‘I shall allow myself the luxury of a carriage ; my clothes will be made by the best tailors ; I shall read the novel of the day ; I shall educate my children,’ etc.

Here there is a new organization of states of consciousness and new syntheses, all formed with the utmost facility (Paulham, Dumont, Dumas).

The negative form of joy corresponds to the cessation of an obstacle to preformed functions ; in other words, to the fulfilment

of a desire, aspiration, or duty that has stood in the way of the regular course of ideas and actions, giving rise to others that are painful. Such is the joy of the student who passes an examination successfully, after long preparation. In this case there is disorganization of the habit of excessive study required in preparation for the examination, and free indulgence may once again be given to old habits when youthful recreations are no longer prevented by excessive work.

The soldier who returns home, after years of absence, from a war in China is seized with unspeakable joy when he meets his mother and his love. They run towards each other with outstretched arms, glowing face, and sparkling eyes; they embrace and kiss one another, giving vent to tears of joy. The obstacle to happiness has been removed, a long-standing desire satisfied; the hardships of the voyage and the habits of life at sea give place to the genial customs of family life.

As is evident to all, the majority of these pleasurable emotions are not distinctly positive or negative. There is prevalence of a mixed type in so far as in most cases there is disorganization of some part of the past, and some impediment is removed. In the emotion of surprise or *emotional shock* of Dumas and P. Janet we have a form of positive joy.

Another of the fundamental emotions is fear. In this particular type we find almost always the same somatic phenomena as were described when speaking of pain. In fact, fear is only pain anticipated, and very often is nothing else than a form of pain. In fear, too, there is a lowering of the muscular tone, extending to momentary paralysis of the voluntary muscles; and, on the other hand, there is spasmodic contraction of the muscles of the vessels and of all the organic muscles (Mosso), with this difference, that in fear the phenomena are much more apparent and intense than in sadness. An individual may say: 'I am oppressed; I can hardly bear my pain;' but fright and terror are paralyzing; they petrify and deprive of speech. People fall to the ground paralyzed by fear. Cries, trembling, sudden starts, paralysis and convulsions, form part of the somatic picture of intense fear. The strong spasmodic contraction of the cutaneous vessels produces shivering, whence the common saying: 'My blood froze in my veins.' Cold sweats, sometimes rapid whitening of the hair, diminution or disappearance of the secretions, constriction of the chest, anguish, difficulty in breathing, and palpitation, with weak pulse or even paralysis of the heart, leading to sudden death from fear, are phenomena of the intense forms of this emotion.

Spasmodic contractions of the organic muscles are much more frequent in fear than in sadness. In fact, it is often the case that people drench themselves with urine through fear. Lange remarks

ironically that 'when the combat is approaching, young conscripts are often obliged to leave the ranks, and if they remain in the line they are not always agreeable neighbours.' Starting eyes, dilated pupils, hair on end, all of which phenomena are dependent on involuntary contractions of the respective muscles, complete the outlines of the somatic picture of fear.

In its slighter degrees, fear may give rise to motor phenomena of another nature—for example, flight or defensive movements. These movements are not the expression of real exaltation of the motor energies, because fear is weakening in all its grades; they are rather stereotyped and instinctive movements that at no time represent the organization of new habitudes or the formation of syntheses, but always maintain the same character, the same form, and the same direction. Sometimes they are completely unconscious, and this is the explanation of those mad flights over many miles, kept up after all danger has passed, without any feeling of fatigue.

In still slighter forms, fear is confounded with pain, of which it is only an anticipation. The candidate who fears that he will be plucked in his examination, the traveller who is afraid of persons lying in wait for him, the mother who fears that her sick child will die, the soldier called to arms in time of war, the lover afraid that someone will carry off his beloved, all afford examples of pain anticipated by imagination.

In an even slighter degree still, the element of fear is present in all actions directed by some desire or aspiration, and hindered in their realization by some difficulty to be overcome. Here the fundamental law of contrast comes into play, being naturally formed by association between the desire to succeed and the risk of failing.

Fear attaches to the unknown and to all that is inexplicable in the present or the future with regard to everyone, in the intellectual and moral sphere, in our cosmic and in our social relations (mysticism, Tanzi).

Fear diminishes in proportion as our notions increase, and as our power of perception of the environment in which we live is sharpened. All states of emotion based on fear induced by religious prejudices tend to disappear, and to be replaced by states of much less intensity, closely connected with the struggle for life; while these latter also lose intensity with the increase of human activities and the facilitation of the perception of the environment and new adaptations. In this way the negativism of fear becomes diminished, even before the open grave, and the value of life increases through efficient activity.

A very common emotion is *anger*, which, were we to be guided in this matter by the examination of the somatic phenomena alone,

would appear to bear the same relation to joy as fear does to pain. We have throughout the same somatic appearances as in joy—dilation of the small vessels, increased cutaneous circulation, heightened colour, swelling of the face and neck, flashing eyes, etc.

In common parlance, we have 'The blood rushes to his head,' and 'When he is vexed he becomes red and swollen like a turkey-cock.' These are popular similes, but they express the demonstrable fact of the increased cutaneous circulation. We observe, however, at the first glance, a difference between anger and joy. In the latter emotion the swelling of the face and the neck is not so pronounced as in anger, neither is there such turgidity of the veins of the forehead and the neck—a consequence of the cries, strong and prolonged expirations, and tumultuous violence of muscular contraction, preventing the regular discharge from the veins of the head. In anger the excito-motor tension is enormous, and generates rapid, energetic, multiple, and often inco-ordinated movements. In the stronger forms of anger, such as fury, the movements are violent in a high degree. The voice is raised, speech rapid and threatening, sometimes confused by overhaste, the arms are held aloft or brought forward, the feet stamp, the eyes are staring, the forehead is deeply furrowed, the angles of the mouth are turned upwards as if to grind the teeth, or the lips are bitten until they bleed, while all obstacles are broken to pieces or thrust out of the way with much noise and violence. Those are the principal signs of anger and of fury.

All the susceptibilities are diminished in a fit of anger. The common expressions 'blinded by rage,' 'deaf with fury,' are true in the sense that slight noises are not noticed by a man in fury, and the field of his vision is necessarily restricted, while in the same way tactile sensibility and sensibility to pain are lessened, if we may judge from the fact that in the heat of a quarrel a wounded man does not at once notice the pain of his wounds.

We have seen that the emotions just described, and which I might call primary and fundamental, have a large number of accompanying physical symptoms constituting an integral part of the emotion, and so fully do they enter into its constitution that some psychologists interpret emotion as simply the consciousness of the somatic phenomena (*vide supra*).

We have referred to the bulbar and cortical origin of these emotional phenomena of circulation, respiration, and secretion, but we cannot refrain from some short notice of the central mechanism of all the phenomena of the expressions and attitudes of the physiognomy, as these take so great a part in emotion. We must distinguish two orders of facts: first, the voluntary expressions by which man and the lower animals communicate to their kind their various states of mind—their different attitudes, their various movements, their voices, or their speech—but it is

not with these that we shall deal here; and, second, those other motor phenomena, also reflecting particular states of mind, such as the movements expressive of pain, fear, hatred, anger, shame, weeping, laughter—movements which are independent of the will, and are based neither on habit nor on imitation.

Bechterew holds that the second class of expressive movements depends upon an innate organization, and manifests itself through a particular mechanism that has no direct relation with the system of nerve-paths serving for the transmission and execution of voluntary movements ('*Die Bedeutung der Sehnhügel auf Grund von experimentellen und pathologischen Daten,*' *Arch. f. Path. u. Phys.*, Von Virchow, 1887). Such movements are involuntary. They are certainly noticed, and may be imitated, but their mechanism is distinct from that of the voluntary movements. They are 'reflex movements of expression,' and may also be produced in animals from which the brain has been removed, and in states of unconsciousness due to chloroform, hysteria, etc.; they may also be modified or suppressed by the will.

The central mechanism of these particular reflexes, *innate movements of expression*, has its seat in the thalamus opticus, according to Bechterew, Meynert, and Flechsig. Kölliker has constructed, after a fashion, the diastaltic arc of these reflexes. He admits that some of these paths go from the thalamus to the red nucleus, and thence to the cerebellum; others from the thalamus to the internal capsule, the cerebral peduncle, and the pons Varolii; others, finally, originating also in the thalamus, proceed through the lamina medullaris lateralis of the thalamus, and through the stratum fenestratum, then pass, like the other efferent bundles, into the internal capsule and the peduncle, and continue their way (possibly in the reticular formation, as Flechsig thinks).

Clinical observations, like the results of experiments, tend to confirm the idea that the innervation of emotional expression is independent of the will. Anencephalics are able, for a considerable time, to cry out and to mimic the attitudes of emotion. In my clinique I have an idiot, microcephalic in the highest degree, who cannot speak at all, and yet expresses the pleasure of eating and drinking by mimicry, sometimes very lively. In not a few cases the mimicry is exaggerated, either through irritation of the centre of involuntary movements, the thalamus opticus, by a focus in its proximity, or through interruption of the paths connecting the thalamus opticus with the cortical centres of inhibition (Brissaud, Mingazzini). Large cortical and subcortical foci, interrupting the paths of the corona radiata cortico-thalamica, and capsular foci irritating the thalamus, but leaving it entire, or almost so, along with its efferent communications, cause spasmodic laughter and weeping, and, in general, an exaggerated expression of emotion.

The observations of Stromayer, Romberg, Nothnagel, Gowers,

Rosenbach, and others, offer further proof of the independence of the mechanism of emotion of that upon the will, because there may be isolated paralysis of the emotional mimicry without paralysis of the voluntary movements. If there is an affection of the upper part of the pons Varolii, through which the fibres of mimicry pass, we may have paralysis exclusively of the mimicry, since the volitional paths (pyramidal) run in the lower parts of the pons. We have already noted the experiments of Bechterew, Bochefontaine, Munk, Ostankow, and Mislowski, proving the existence, on the somæsthetic zone, of centres for the movements of the face, the larynx, respiration, circulation, and tears, so that consequently that area might be considered as the seat of the movements expressive of emotion, especially weeping and laughter.

Clinical observations, however, do not confirm this supposition. Bilateral destruction of the Rolandic zone paralyzes the voluntary movements of the face, but not the movements expressive of emotion. Now, as the existence of physiognomic centres in the thalamus opticus appears to have been proved, it is much more logical to admit that the cortical centres are volitional, and that the centres in the thalamus are intended for the involuntary expression of emotions. This view is the one best supported by facts. Brissaud, Monakow, and Mingazzini agree upon this theory, with some modifications. According to these observers, the thalamus opticus is the centre of movements co-ordinated for the physiognomic expressions of emotion; while, according to Brissaud, the frontal lobe is the psychic and regulative centre of the function of the thalamus. The anterior tract of the internal capsule would represent the path by which the moderating influence of the cerebral mantle is exercised upon the thalamus opticus. All lesions of this tract of the capsule, by withdrawing the thalamus from the inhibition of the mantle, give rise to exaggerated emotive expression, and especially to spasmodic weeping and laughter, provoked by stimuli coming through the sensory paths or from the sensory zones, which are in connection with the thalamus (Monakow).

The part taken in the expression of emotion by the medulla oblongata is shown by the observations of Oppenheim, as well as by our knowledge of the anatomical relations of the nuclei of the medulla oblongata with the thalamus. It is not improbable that the bulb represents one of the centres stationed along the paths for expression of the emotions.

From the researches here recorded there emerges once again the coexistence of two facts in emotion: emotional representations, of cortical origin; and emotional expressions, originating in the thalamus, and perhaps also in the bulb. The expression may be reproduced by peripheral stimuli without analogous emotional representations, and, on the other hand, the emotion may be concealed by the restraining power of the mantle over the emotive

reflexes of the thalamus. This double series of facts renders the theory of James-Lange still more uncertain.

THE PATHOLOGY OF THE EMOTIONS comprises the greater part of the mental maladies. Every one of these, as a symptomatic complex or syndrome, is to be considered also from the side of the emotions, which are, in most cases, essential components of the malady. From this fact it becomes clear that we cannot undertake here a methodical study of the pathology of the emotions. For the most part it is reserved for the third section of this work. Here we limit ourselves to stating only the general conception of the physiology and pathology of the emotions, a conception that will be completed in the study of the individual forms assumed by mental disorder. This appears all the more necessary as every day we are becoming more certain of the important part played by the emotions in the genesis and development of those mental maladies that were formerly considered to be of intellectual origin (Ferrari, *Rivista Sperim. di Freniatria*, 1901).

MORBID DEPRESSION.—Moral pain, prolonged, and disproportionate to the cause producing it, is morbid. It passes through all grades, from simple bad humour to the passive and the agitated or active form of melancholy.

Along with the gloomy disposition there is fear, suspicion, negativism, tedium, asthenia, inefficacy. The sadness that allows the subject still to hold his own place on the chess-board of common life is the constant note of neurasthenia, of whatsoever form and degree, whether inherited or acquired. Asthenia and sadness are two manifestations of the same state. As sadness is always accompanied by asthenia, so it is very seldom that asthenia is not clothed in vestments of sadness. Whenever the somatic *ego* is, or is thought to be, weakened, and incapable of bearing the shock of the cosmic agencies, or whenever the *social ego* experiences insufficiency in its human relations, depression invades the mind, and expresses itself in pathological forms, among which we note humility, modesty, shamefacedness, incertitude, suspicion, fear, ill-humour, and the pessimism that produces the victims of the most pronounced forms of melancholy. A particular type of this group is afforded by the timid subject.

Timidity is an emotion composed of mingled fear and shame, determined by particular circumstances. The emotion comprises a complex state of disturbance, confusion, embarrassment, hesitation, fear, scruples, modesty, accompanied by organic manifestations, such as palpitation of the heart, anguish, cold sweats, tremors, and reddening of the face. The circumstances that give rise to this complex of phenomena may be summed up as the presence of another human being. It is only in the presence of his fellows, as Hartenberg says in his valuable monograph (*Les Timides et la*

Timidité, Paris, 1901), that the timid subject is disturbed, colours up, suffers anguish, trembles, and palpitates. He is, above all, an ego-altruistic sensitive subject; he is afraid of compromising his own dignity, and of giving any offence to the susceptibilities of others. From this there arises, on the one hand, the analytical perspicacity of the timid subject in penetrating the sentiments of others, so as to avoid offending or opposing them in any way (Dugas); and, on the other hand, his exaggerated scrupulosity in social relations, leading him to take every care to avoid shocking those with whom he comes in contact.

Shame is allied to fear in the timid subject. This is a very complex emotion, of which the degrees are chastity and modesty. It has its own characteristic expression in reddening of the face, with a slight acceleration of the heart-beats. Shame is a cause of great torture. From the youth who hesitates to enter a drawing-room because he imagines that everyone is looking at him, and is afraid that others may notice some fault in his behaviour, to the orator who fears that words will fail him or serve him badly, there is a gradation, in which we find a predominance of weak subjects who are ashamed of trifles and always incapable of managing their own affairs.

Emotive sensitiveness induces a certain hypertrophy of egoism, giving rise to an exaggerated *amour propre*, and this is, at bottom, the danger threatening the spiritual *ego*, and especially the social *ego*, containing as it does the latent germ of pride, that develops rapidly in certain circumstances.

Timidity is the cause of ereutophobia, of which we have already spoken, and of other forms of neurosis.

The *neurosis of anguish* of Freud ('*Angstneurose*,' *Neurologisches Centralblatt*, 1895) and of Hartenberg (*La Névrose d'angoisse*, Paris, 1902) is characterized by great *algesic irritability* of the *ego*, with prevailing susceptibility to noises (aural hyperæsthesia), while the mind is directed upon the emotion of fear. This particular condition sharpens the power of attention, in the sense that it gives rise to a preoccupation about some imminent harm or danger, the nature of which varies much in different subjects. Most of the cases are those of women preoccupied about their husbands or children. Thus, if a cough is heard, they instantly dread a serious affection of the lungs (in the husband or child); a ring at the door-bell rouses strong apprehension of sad news; a thunderstorm brewing and announcing itself by the first clap awakens great fear of possible harm and danger; any unusual sensation in the chest throws them into a state of the utmost consternation through fear of consumption; if a son is late in coming home, they are greatly agitated, picturing him beset by all the dangers of this world. Very frequently they are afraid of losing their sanity, in which case they have an absolute dread of the

alienist, and the mere mention of lunatics, insanity, or doctors of insanity, throws them into a state of indescribable anguish.

This condition of affairs may be episodic in a neuropathic constitution, but most frequently it constitutes a true morbid form. The sufferer is continually tormented in every phase of his life by the phenomena above described. With Hartenberg, however, I must admit a neurosis of pure anguish, which is frequently met with ; also attacks of anguish in neurasthenia and hysteria.

Some of these representatives of painful hypermotivity occasionally show ready but disproportionate and violent reaction.

It is a short step from the neurosis of anguish to obsession by fear. In these cases of obsession we have always an irrational fear, produced at one time under circumstances that would naturally cause it, and exaggerated by imagination, and by the direction of the attention to the state of emotion that already occupies the consciousness. It is important to note that the fact determining this state of emotion has existed, either really or in the form of a representation. The strong repugnance felt on coming in contact with dirt in any form, the shudder on seeing a dirty person or thing, give rise to a powerful emotion that causes the subject constant fear of defiling himself by touching anything at all. He accordingly takes measures to avoid contact of any sort, and should a contact occur it gives rise to a strong and exaggerated emotion, just as if he had really been defiled.

If a predisposed or hypersensitive individual, overtaken by a thunderstorm, with lightning and a deluge of rain, be overcome by intense fear of the danger he runs ; or if, when he is at home, a thunder-bolt should fall in his vicinity with great noise, destroying something or killing somebody, there will remain with him an emotive potential of fear, related to the representations of the causes that first determined it, so that either the mere representation or the approach of the tempest produces the same sense of emotion, and always with the same intensity. This is sometimes so irrational as to constitute a veritable morbid fact. The subject turns pale, suffers from tremors, dryness of the mouth, visceral movements, diarrhœic discharges, sometimes nausea, palpitation, oppression, or even a fit of real anguish (*siderophobia*).

If an individual has suffered from terror, or something extremely disagreeable in his own house, he will have a horror of that house that is sometimes invincible (*oikophobia* of Verga, Salemi-Pace, and others).

The fear of darkness owes its origin to the tales told to infants of hideous beings—werewolves, witches, fairies, evil spirits, all of whose doings occur by night. It is through unconscious association that many children and young people are afraid of night, as the season of evil doing, and there does not seem to be much probability in the hypothesis of Ferè, who makes this emotion depend

on the diminution of vital activity due to the lack of that physiological excitant—light.

The fear of being buried alive (*taphophobia*) and the fear of being deformed (*dysmorphophobia*, Morselli) are merely reproductions of preformed emotions and images. We shall have to speak of these at length in the third part of this work.

Recently I have observed two cases of ereutophobia, and the result has had not a little influence on my adverse opinion of the somatic theory of the emotions. One of these was a young man of about twenty-four years, rather intelligent, but hypersensitive, excitable, and belonging to a family suffering from neuropathic heredity. For a long time he had been subject to flushing of the face and a feeling of fulness in the head, with a slight clouding of consciousness under the action of even insignificant impressions; yet he had never had any preoccupation about this, nor had he ever been troubled about or ashamed of his blushing, until one day a friend told him that he reddened too easily.

From that time he had no longer any peace. He suffered unbearable anguish whenever he happened to meet any person, even one he knew well, or when he found that someone was looking at him. The same thing occurred whenever he had to meet in business even persons with whom he had had frequent dealings. In this case it was clear that it was not the fact that he was conscious of the reddening of the face and the fulness in the head that gave rise to the emotional state, but his belief that his blushes, when noticed by others, compromised him, or at least compromised his dignity as a man. Here also, therefore, the psychic component was clearly the indispensable condition in the production of the emotion, and hence it is evident that the somatic component alone does not produce the emotion, even though it be felt. The fear of blushing, as has been noted by Bechterew, Pitres, and Regis, causes extraordinary anguish, and the sufferers indulge in the idea of suicide.

Whatever be the intellectual or representative content of such emotions—and in their variety these emotions may extend to all the objects and all the positions that may, by any accident whatsoever, provoke an emotion of fear—there always coincide with them the physiological mutations of the emotion of fear: precordial distress, disturbance of the respiration, muscular relaxation, pallor, great frequency of heart-beats, etc.

Fear is an attribute of the weak, who are afraid of every new thing. For them habituation is the indispensable condition of existence. They are, as Lombroso happily characterizes them, misoneists *par excellence*. Every new adaptation presents to them almost insurmountable difficulties, and becomes an object of fear. Of course, it must be understood that sometimes, as Sighele observes, these weak subjects may also be fond of novelty, but in this case

the novelties they hanker after are those that present no difficulty, as, for example, the love of new clothes or new fashions. It is fear that keeps many from giving expression to their own opinions, or from taking up a decided attitude in political, religious, commercial, or industrial movements. What we term individual indifference, or the indifference of a whole race, is often the product of a lack of positive and determinative emotions ; or it is produced by fear, which is paralyzing. In these cases the subject is urged on paths that offer least resistance, but end in fields that are not favoured by fortune.

A condition of anguish is also produced by the state of doubt. Physiologically, the choice between two ways—to do or not to do—when the effects of the action do not appear clear, and especially when a fortune is at stake, or when the personality *in toto* or one of its important factors is involved, causes anguish from the difficulty attaching to the choice. This suffering is shorter in duration in proportion as the judgment is more rapid or action readier. In the morbid state, on the contrary, doubt unceasingly returns to torment the consciousness with regard to matters that have been seriously studied, or about questions of faith that were never a subject of discussion, or even all the acts of life, and particularly the most trifling. It is chiefly theological doctrine or religious faith that is harassed by doubt in individuals who, for a long time, had never a doubt at all.

A Jesuit of great mental power, and of more than ordinary culture, who had been for many years a professor of theology at home and abroad, and who was long confined in the asylum for a form of circular insanity, had from his youth, including the years when he was a student and had won universal esteem, suffered from tormenting doubt about the theological doctrines that he taught, and of whose truth he was convinced. He was continually harassed by doubts in matters of faith.

In other cases doubt does not act upon the field of intellect, but affects the consciousness of all the actions performed. Sometimes it appears to be nourished by defective perception and judgment, as, for example, in the terrible doubt some people have of compromising themselves, or of having already compromised themselves, by putting their signature to a letter, deed, or contract. In other cases it appears to be rather a defect of memory, as when an individual is seized by strong anguish after posting a letter, being in doubt whether he has signed it ; or when he is constrained to rise from bed a second or a third time to go and see that the house door, which had been opened a little previously, has been properly closed. In all these cases the chief defect is of muscular or kinæsthetic memory, because it is not that the sufferer does not remember the signing of the letter or the closing of the door, but his recollection is, as it were, an abstraction. It seems to lack the

kinæsthetic component of completed action, which identifies the person with the action and with the recollection of it.

A state of anguish is also produced by the disappearance of the affections from consciousness. Most instances are furnished by women, who are overcome by profound sadness because they no longer feel the affections of wife or mother. 'My sole joy,' said a lady, 'was the very great affection that I had for my children; I lived on that, and it was the greatest treasure of my life: but now I have no affection at all. I feel that there is a great void in my mind, and I do not know what reason I have for living any longer.' That lady had a tendency to suicide, and the reason of it was that her personality, the spiritual *ego*, had been much diminished and disintegrated by the simple fact that its most active component had disappeared from consciousness.

Suspicion is simply preperceived fear, and is due to defect of perception and of the power of attention, both of these being in inverse ratio to the fear, which is always the expression of weakness and inferiority, whether it be in consciousness or on the threshold of consciousness, under the form of suspicion. As an intermediate link in the psychic processes leading to action in social relations, it may be considered as a physiological fact, provided that it does not stop action or lead it astray owing to fear. It arises from the difficulties that every man meets with in pursuing his personal aims in society, as these difficulties oppose innumerable resistances to his efforts. Physiological suspicion invites attention to, and investigation of, every position that threatens loss or danger, and it disappears with the judgment furnished by sure observation. If it prevents or interrupts action, or lays open the obscure depths of representation and action, it becomes a pathological phenomenon, the expression of a state, which, by filling the consciousness with the images to which the suspicion is referable, frequently gives rise to illusions, and prepares or feeds the germ of some forms of paranoia (of persecution and jealousy). Paranoic deliria are usually of emotional origin (Ferè, Ferrari). As a matter of fact, if the weakened subject, owing to the altered process of perception, does not manage to form a clear judgment as to his relations with his environment, he begins to suspect the perfectly honest behaviour of his friend, he sees a threat in every malicious look, a trap in any witticism. Such a man has already entered on the path of paranoia.

But even though they do not reach this high degree of development, suspicious persons form that phalanx of fearful and undecided people who find insuperable difficulties in the supposed manoeuvres of their neighbours, and are always beholding their interests or their persons in danger, threatened or plotted against.

Fear and suspicion are characteristics of inferiority; they are regressive manifestations, and are a cause of economic poverty.

because it is not for them that Fortune reserves her victories. They represent true rheostats in consciousness, internal resistances, increasing in inverse ratio to the vigour and rapidity of action.

In some cases, however, the painful tone of mind increases the tension that is ready to be discharged under the slightest stimuli. Reaction is immediate and exaggerated, and the more so in proportion as the threshold of pleasure is with difficulty accessible. This offers no contradiction to the general law: the action is simple, inefficacious, and negative, and arises from the hypertension, through contrast, of the *ego* confronted by obstacles. The sufferers are discontented, irascible, and violent.

There are neurasthenic, hysteric, and epileptic subjects, and individuals who have suffered from shock, or an organic lesion of the brain, who are violent and choleric by reason of their suffering. They laugh or cry on the slightest occasion, are subject to violent impulses and fits of anger. These are the commonest symptoms. One of the characteristics of epilepsy, even when epileptic convulsions are absent, is the great irascibility, the intense reaction, even to slight stimuli. In these cases anger does not arise from joy. The epileptic is not a joyful subject; at bottom he is afflicted and fearful. The regulative powers that usually intervene in physiological reaction are wanting, or cannot be brought into service. If these, which consist of groups of ideas and other feelings in contrast, are either absent, or are weak and colourless, and do not penetrate into the field of consciousness, the latter will be governed only by the representations aroused by the actual stimulus, the sole determinant of action. These states are not true and proper maladies, but gradations of anomalous character, more marked in certain morbid conditions, as phrenasthenia, hysteria, and epilepsy.

MORBID GAIETY.—It is not always easy to distinguish some forms of morbid gaiety from physiological mirth. Every person has experienced the inward joy that comes with good news or some happy event. It is constituted of a feeling of well-being, of strength, of one's own efficiency, and of the increased influence of one's personality in social relations. These joys last for a relatively short time, and leave a trace that becomes a historical component of the personality; then equilibrium is re-established sooner or later, with the formation of a new habitude. From that state of equilibrium the mind is aroused to new joys by new victories, or is cast down into the regions of grief by defeat or fresh difficulties. Thus life goes on, leaving behind an irregular diagram of ascending and descending lines, symbols of alternations of pleasure and pain.

Some individuals are generally hilarious, and their psycho-organic habitudes are not easily disturbed by internal or external influences. They are moderate in their desires, and have an ex-

uberant sense of vigour; they are agreeable and expansive, know nothing of difficulties, and are the favourites in all parties and meetings. Some of these are actually possessed of vigour, and do not feel resistance very much, winning for themselves a rich intellectual equipment, ever new energies and resources, and easily attaining any object that is not out of proportion to their powers. Others are weak in spirit, incapable of any great synthesis, anecdotic, sometimes happy in their irony and in contrasts; these excite laughter and diffuse hilarity among their friends. They also are expansive. There are others, still poorer in spirit, vain and pompous, knowing nothing of the world, but with a strong consciousness of themselves, due to exuberant kinæsthesia. The organic *ego* preponderates over the spiritual *ego*, and they assume a stupidly haughty attitude in the contemplation of their own persons, with regard to which they sometimes have the feelings of æsthetes.

As will be seen from this very brief sketch, morbid gaiety, like morbid pain, cannot always be clearly distinguished from the physiological emotions. From the normal to the morbid the passage is by gradations. We can only affirm that mirth is morbid when it is excessive, and is not determined by sufficient causes.

We distinguish a calm gaiety, which is reduced solely to the change of tone of consciousness and to the well-known organic modifications characterizing joy in its various degrees, and joy that is expressed in words, movements, laughter, dancing, singing, etc. The general characteristics are a feeling of well-being, of power, of lightness in the head, limbs, and body. The senses are more acute; taste, smell, and sight become more delicate, and facilitate pleasurable relations with the external world. The memory is readier and happier, while associations are more rapid, more extended, and more numerous, thus giving another source of pleasure. The kinæsthesia, elevated by the feeling of well-being, the easy syntheses, the exuberance of affective tensions, the slightness of resistance in the motor circuits, produce the expansiveness of the mirthful subject, his facility of speech, and rapidity of reaction under every form. The power of the *ego* that has been freed from internal resistances in consciousness, such as doubts and contrasting ideas and sentiments, gives the illusion that external resistances are also diminished to the same extent, and when a man is in this state, with the circles of criticism closed, he gives himself up to undertakings that may easily ruin him. One of Hartenberg's patients used to say: 'How pleased I am! I am sure that a great fortune is going to fall to me.' I am in just such a state as if I had won a big prize in a lottery.'

In proportion as resistance and the inhibiting powers represented by contrasting ideas and feelings are defective or completely wanting, these sufferers generally turn out troublesome in varying degrees, or even immoral. Witticisms, scoffing, irony, insults,

trivialities, coquetry, lasciviousness, shamelessness, and even violence, are sometimes accompaniments of morbid mirth.

Morbid joy is always met with in true mania, and in all the maniacal phases or episodes of other maladies, such as circular insanity, and especially paralytic dementia. It is a characteristic also of the first stage of alcoholic inebriation, and of all forms of expansive paranoia, while it is met with episodically in the hallucinatory forms, especially those of religious or erotic content, in hysteria, epilepsy, etc.

We know the anger that arises from psychic hyperalgesia, but it is easy to recognise the existence of an anger proper to the hilarious personality, as it is more violent, insomuch as the hilarious subject, with exuberance of all psycho-somatic energies, meets with no resistance in the internal circuits, and will not therefore tolerate any in the external circuits. He thus reacts excessively to opposing obstacles, with a violence and rapidity proportionate to the psycho-kinæsthetic tensions occurring in the state of joy just described. These discharges are so much the more violent and destructive because there are open to them the small circuits of muscular action, whilst the large circuits of the intellect and of the other inhibiting forces are closed against them.

One form of gaiety is vanity, which passes by degrees from the physiological form manifested by a man and a woman on their first meeting to the pathological form, commencing with 'the small pride befitting small objects and small men' (Mantegazza, 'Physiognomy and Mimicry' 1881). Usually it is a pretence of superiority tending to the undue display of some good quality, or to the undue assertion of the value of a person as a human being, on account of some one of the qualities that predominate in his self-admiration. So it is with the beautiful and agreeable qualities of a woman, who will indulge in more or less shameless flirtation; and so with the handsome form, the strength, the physical and intellectual power of man. There is the need of displaying something that will make us excel, something referable to our own persons or our own qualities, to our power or to notoriety. There is always simulation, from the illusion of the imbecile about his own capacity to the silent and authoritative pose of ignorance; from the restless striving of the scientist after notoriety to the admiration for which the Deputy complacently lays himself out as he conducts amiable ladies to the gallery of the House to hear the prosaic speech that he is going to deliver; from the artist, enamoured of himself and his boasted creation, to the criminal, who is more interested in the notoriety he has earned by his crime than in his own condemnation. Vanity is very common in weak-minded persons, in hysterical subjects, in

the slighter forms of mania, and most of all, as Lombroso has well shown, in born criminals.

In his vanity man either pretends to beauty, strength, capacity, and power that he does not possess, or he displays in a fair and seducing light all that he has. Pride is a true feeling of superiority, based generally on some intellectual power, on strength or capacity. There is a tendency of the social *ego* to assert itself, and unlimited virtuosity of expansion. 'The man who has such a vigorous consciousness of himself,' says Ribot, 'resembles those prolific and strong-lived species of animals and vegetables that would cover the whole surface of the globe themselves alone.' The proud can suffer no obstacle, or even admit the existence of obstacles, and when they do meet with any in their paths, their feeling of superiority at once leads them to take up some aggressive attitude, which may be insolent or brutal. I know two forms of pride—the genuine, frank, and sincere pride, that bears its own proper physiognomy, and the dissimulated pride of many men of high rank. The latter conceal their pride under the robes of authority or modesty, whilst sincere pride is always displayed, especially before equals or inferiors. Genuine pride walks with head erect, the body straight and slightly inclined backwards, the chest distended and projecting, sure and measured step, brief and imperious speech; the gaze is directed upwards or to the horizon, the lower lip protrudes, and the mouth is firmly closed (Mantegazza). Pride is a form of egoistic joy, and may be considered as the fertile soil of paranoia of grandeur. It reaches its maximum morbid development in that malady and in the first phases of certain forms of progressive paralysis, and that is my only reason for mentioning it here.

We have already said that the religious sentiment is not intrinsic and necessary to human consciousness, but has been evolved, with all its factors of mysticism, of fear and of pleasure, and has become by long tradition a mental habit. Very weak as it is among us, it makes upon me the impression of a mist involving the consciousness, and clearing away in parts. For many people it is a matter of words rather than of thoughts and sentiments. In others, vanity and fear hold the place of faith and belief. Idolatry among the common people, political interest among the upper classes of society, mystic misoneism, sceptical indifference and fanaticism—those are the morbid forms assumed in most cases in the absence of strong faith in a Supreme Being. In mental maladies, therefore, the religious sentiment almost always disappears, and at most there remains in some cases the habit of religious observances. Many who frequent the church, who pray for hours at a time, and thread their beads continuously, feel none of the emotions that are the basis of the religious sentiment. Mysticism is a region of joy, in so

far as it presents no difficulties either to thought or action, while it expands the *ego* in its relations with the divinity and the unknown. Religious character is often a mere varnish that insanity removes, just as fever destroys all the cosmetic embellishments of the simulator of youthful beauty. Even when the religious sentiment is more consistent, it vanishes with the malady; insanity very quickly sweeps away that perfume of the soul.

In mental disorders of religious content we have to do with something quite different from the religious sentiment. Here the religious nucleus of the personality is substantially altered, in so far as the *ego* is either shipwrecked among the breakers of religious fear—auto-culpability, damnation, perdition, or demonomania—or it is exalted to the dignity of the divine. In the first case we come back to the region of morbid pain and fear, in the second to that of expansive paranoia.

Asceticism is a morbid state of mystic joy, arising from the pleasure that the spiritual *ego* takes in its own expansion until it comes into contact with divinity. It is accompanied by constantly growing detachment from the ordinary concerns of life, abandonment of personal duties, and, in the more marked cases, isolation in caves or on mountains and closer relations with the divinity. In the legend of Buddha, who passed years on the mountains of Ourouvela, in the stories of St. Catherine of Siena, St. Anthony, St. Francis of Assisi, and many others, we see that apostles of religion passed periods of contemplative isolation in alternation with seasons of propaganda and apostolate.

Again, we often meet with ecstasy, the maximum of mental concentration, a form of joy. The ecstatic subject is completely abstracted from his surroundings, and, in the more pronounced degrees of the malady, hallucinations are frequently present. Religious ecstasy is always morbid joy, and grows in neuropathic soil, either congenital or acquired; but we must not confound it with concentrated attention or with the more or less powerful æsthetic pleasures.

The paranoic believes that he has become a Messiah, that he is inspired, and that a great task has been reserved for him in this world. Here it is not the religious sentiment that is at work, but the exalted and deranged personal *ego*, which utilizes religious belief in the interpretation of a new state in concord with the new character of the personality.

The family sentiment has very deep roots in the constitution of the *ego* in its three modes of being—the somatic, the spiritual, and the social.

From the tactile pleasure of suckling to the more complex pleasures of alimentionation and those that arise from protection from all dangers of infancy, childhood, and youth, the family becomes

an inexhaustible source of joy, through which the personality is evolved and assisted to overcome the difficulties of life. A very large number of the components of consciousness arise from this source: the mother's smile that invites infant hands to caress; the word that offers comfort for the sufferings of childhood; the equal participation in all the vicissitudes of life—its joys, its griefs, its common interests; the imitation of one another and the reciprocal suggestions; the solidarity of that little society where the grief of one is lightened by others sharing it, and where joy is diffused like a perfume, and measured by the number of the family—these originate a very complex feeling, which in its evolution writes a never-to-be-forgotten story in the consciousness, a story that is comprehensible only through the representation of all the members of the family. It is for this reason that the family sentiment offers strong resistance to any malady that dissolves the personality. The pleasure of possession or of exercising power, reciprocity of defence, hope, foresight, comfort in old age, are all components of the family sentiment that have struck deep roots, and malady does not destroy them. In many mental affections the sentiment is found to be weakened, but not extinguished. The melancholic subject is often preoccupied about his family, and would like to return to it. The persecuted paranoic may still have confidence in the members of his family, and while he distrusts all others, in the midst of his own he feels himself secure or in less danger. Many patients in the asylum protest against being taken from their own homes, and others are overcome with joy when they are visited by their relatives. Preoccupation about the family furnishes material to the delirium of melancholic subjects. On the other hand, love for the family is extinguished in paranoia of pride or religion. In predisposed persons it degenerates into jealousy and, through psychic contrast, into inveterate hatred, or into impulses to injure the person most loved.

We have spoken also of love as a complex sentiment, rising from simple tactile pleasure to the highest emotional and intellectual expression. This development is accomplished by the assimilation of many new components—sensory, emotional, and intellectual.

The evolution proceeds from the simple sexual form to the sympathetic-sexual and to the æsthetic-sexual (which includes also the intellectual components). On this psycho-physiological outline we might construct a chapter on the psycho-pathology of love, for its pathological forms are many, and its defects and perversions are to be found in multitudes.

There are persons who do not love, and who never had any inclination towards individuals of the other sex. These are frigid anomalies, imbeciles or idiots. I have no pleasure in hearing

a young man of twenty-six confess to me : ' I have never approached a woman, and I feel no desire to do so.'

Episodically, sufferers from melancholia feel no affection. They are too self-centred, too preoccupied, too suffering, and therefore have no love for others. The mind is polarized in a direction opposite to that which consists with physiological love. In such cases there is at the utmost self-centred raptus sexualis, and that is not love. The true sufferer does not love. There is very little love with the persecuted paranoic or with the megalomaniac, the latter of whom is very egoistic. On the other hand, in states of maniacal excitement and in some forms of progressive paralysis, especially at the beginning, there is often an exaltation of the sentiment of love—always understanding that the sentiment is less exalted than the instinct. Usually there is a loss of the sentimental and intellectual element, and therefore a commencement of dissolution, whilst with the extinction of the intellectual component of love the brute instinct demands prompter satisfaction, and is less guarded in its demands.

There is a form of exaltation of ideal love in hereditary (congenital) neurasthenic dreamers, imbecile natures, exalted paranoics, hereditary subjects, who love according to some romantic ideal. Through want of courage and intellectual resources these weaklings consume themselves in vain desire. They are idealists who dream of the love of women with whom they will never come in contact, or of unknown celebrities and beauties ; or they are hysterical women, more or less anæsthetic, who are pleased only to excite and to torment.

Evolution may be arrested at one of its stages, and there may be a morbid preponderance of one of the components of love, either the instinctive or the intellectual ; there may also be disproportion or want of harmony between these.

Idiots sometimes show brutal manifestations of the sexual instinct. They go so far as to attack a woman in the public street or in her own house—sometimes their own mothers. In some weak-minded persons (phrenasthenics), more fully evolved than the preceding class, the instinct of love is more guarded, and is even accompanied by some elements of sympathy. In other predisposed, anomalous, eccentric, idealistic, or weak-minded persons there is a great preponderance of the intellectual element. The majority of men have the instinctive element, and are certainly defective in, although they possess many of, the intellectual and moral components of love.

After this class of normal men we place those with excessive or extraordinary sexual excitability ; here we have nymphomania, satyriasis, and the sexual crises of tabes.

Next come the morbid groups, the most frequent being the idealists of love, or the pure platonics, who are often impotent.

These may be represented by a great pyramid, on the apex of which are those affected by *paranoia erotica*.

After these we place the perversions, which range from *amor synecdochicus* and masochism to the inversion of the sexual instinct; but of these we shall speak in a special chapter.

The pathology of the moral sentiment becomes confused in the vortex of social life. From the normal condition to the maximum degree of immorality we pass through innumerable shades and gradations.

The moral sentiment disappears in insanity. I do not know of a single insane person who has preserved it intact, in the sense that he does or does not do beneficent or injurious acts with consciousness of what he is doing. Further, the emotional nature and the facile reaction of the neurasthenic subject show how little he can resist the instinctive demands of the ego when he is excited. The moral sentiment is a high point of human evolution and a complex mental product, and therefore it is more certain than almost any other to be destroyed by a mental disorder of any sort whatsoever. Destined to succeed the vanishing sentiment of religion, the moral sentiment has not yet struck deep roots in human consciousness, and so it vacillates. Egoism finds means to enwrap itself in the most elegant vestures of the civilization of the great cities of both hemispheres, and immorality in lordly robes, or concealed in the flattering words of the market and the suggestive elegance of the club, in public and administrative offices, does much more harm than the primitive egoism of the savage.

The latter is a survival, and gives us primitive delinquency—*theft, rapine, homicide*; the former gives us civilized delinquency, that ruins the fortune or the reputation of a man or of a family, and often escapes the penal code. It is only the arms of offence that vary, according to the times and to the intellectual components of which immorality astutely avails itself for its enterprises and its victories.

CHAPTER VI

THE WILL—PHYSIO-PATHOLOGY

ALL psychic products result from the transformation, in the nervous system, of the energies of the external world into components of the intellect and of the emotions, and they have a tendency to resolve themselves into motion. The brain is a veritable transformer of the cosmic energies into emotions and ideas, which, in their turn, are reduced to motion. The emotions, on the one hand, are reflected upon the thalamus, and on the inferior centres of the accompanying organic phenomena, perhaps also upon the somæsthetic zone, while, on the other hand, they give colour to the ideas and increase their motor potential. Ideas have always a tendency towards expression in speech and in action, and this will be the more complex the greater the number of the constituent elements of the intellectual syntheses. But action, of whatever nature it be, is more ready and efficacious with a *quid* and with a *quale* of emotion, constituting what we call interest. When these two components associated with the intellectual syntheses are absent or too feeble, action fails or remains in consciousness as a simple motor tendency, rudimentary and inefficacious.

The *quid* of emotion associated with ideas must not exceed a certain measure ; and the *quale* of emotion determines the form and direction of the action. When the emotion exceeds a determined degree of intensity, it tends to be resolved into inferior reflexes, with a prevalence of somatic phenomena and a loss in value of the intellectual syntheses. If, on the other hand, the *quale* of emotion is characteristic of the inferior types of emotivity, in this case also action is resolved in the small reflex circuits, with insufficient directive influence of the intellectual syntheses. High mental evolution presupposes the predominance of emotions of a high order which have assimilated the greatest possible number of intellectual components and of altruistic emotions, these last being, under like conditions of intellectual development, the surest guarantee for the determination of complicated and efficacious action.

We may therefore conclude that human actions are only reflexes

governed by the same laws as govern the spinal reflexes. These latter become progressively complex in proportion to the increase in the number of nervous elements contributing to them. It is natural that the spinal reflexes should be simpler than those having their centres in the optic lobes, that the latter should be simpler than the thalamic reflexes, and should reach their maximum degree of complexity and variability in the cerebral mantle.

If we could imagine what a large sum of stimuli is included in the investigation of a problem of microscopy, as, for example, the structure of the nerve-cell, in comparison with the sum of stimuli acting upon a hungry man who sees a piece of bread—and what a difference there exists between the latter and the contact with the sole of the foot that determines the plantar reflex—we should, perhaps, find the reason of the simplicity of the last in comparison with the complication of the second, and the complexity of the series of reactions in the first, which demands many years of labour, proportionately to the number and the complexity of the intellectual syntheses.

It is the reflexes of the intellectual and emotional syntheses—that is to say, the reflexes in the mantle—that we call voluntary. The will is nothing more than the conscious resolution of the motor tendencies of the intellectual-emotional syntheses, and we may figure it to ourselves as a conscious motor potential tending to discharge itself through circuits of various orders, from the lowest, which much resemble the inferior and instinctive reflexes, to the highest, which are represented in the actions of the heroes of humanity.

One of the forms of will is that we call voluntary attention. In the second chapter we have seen that sensory stimuli give rise to a reflex of the mantle that goes under the name of reflex, passive or sensory attention. This may depend upon the fact that the amount of motion evoked and emitted is small in comparison with the intensity of the stimulus, coinciding with a slight intensification of the sensation. When the sensation is strong in comparison with the intensity of the stimulus, which consequently gives rise to a relatively great movement, the attention is termed voluntary. It is clear that the intensification of the sensation can take place only through the calling up of associated images evoked by the slight stimulus, and this leads us to conclude that, under equal conditions, voluntary attention is in proportion to the mental content that can be evoked in a given unit of time under the influence of external or internal stimuli; and also to the resistance that it meets with owing to non-habituation of the paths of association and of those through which it is discharged.

This last form of attention sometimes presents another character when it meets with strong resistance to its exercise, and becomes a particular condition of consciousness termed *effort*.

In the sphere of attention, effort consists in the maximum degree of concentration of the power of attention, as if to close all the collateral circuits and to open to the discharge only those channels that will most easily and surely lead to the object of attention. In general, effort represents the maximum concentration of the motor potential, proportioned to maximum resistances. Thus we find, even in common parlance, the phrase 'effort of will.'

One of the most important links of volitional reflex is *desire*, of which we have already made some mention in the preceding chapter on Emotion. Here we add that desire, adopting the phraseology of Mercier, is will *in posse*, and arises from the increased motor and emotional potential of a determined nervous mechanism, which fills the consciousness until the discharge has been effected, or until it is substituted by another mechanism, itself also overcharged with high emotional and motor tension. As the charge on such mechanism increases, desire becomes more intense, and reaches the mechanism of will, into which that of desire discharges its tensions. Desire, and therefore will, are always tending towards movements that will procure pleasure and integration, and remove pain or disintegration.

Two orders of voluntary actions are to be distinguished: those determined by instinct and those determined by reason. Sometimes both mechanisms become overcharged with motor tension in conflict with consciousness. Instinct discharges itself along shorter circuits, and the moment preceding the discharge we call determination. The intervention of the mechanism of reason characterizes what we term free choice.

The problem of determination is extremely important, because choice is sometimes in conflict with determination, whose power, in that relation, depends upon the degree of organization of the mechanism of the corresponding activity, and upon the motor potential of such organized mechanism.

Choice always coincides with a conflict in consciousness between different motor potentials in relation with ideative or emotional mechanisms, which in their turn surcharge motor mechanisms. In choice the power of attention also increases, and when it works upon the memory and the imagination it raises the efficiency of the separate ideative mechanisms to a high potential. Thought, imagination, and attention are coefficients of will with choice. The resolution of attention will come from that mechanism in which the potential has been raised highest by the interest excited by the emotion, in connection with the judgment of advantage and utility to the personality. Here another factor, also based upon attention and imagination, comes into play—that is, inhibition, represented by other ideative and motor mechanisms which have been called into activity for the purpose of removing what is less useful or even dangerous to the personality. On the chess-board of

ideative and emotional mechanisms, to which choice and the act of deliberation are referable, the game that is played involves the fate of the personality. That one of the mechanisms which has reached the highest degree of intensification of thought discharges its tension. Intensification implies judgment and attention. The motive is furnished by interest, and therefore by the desire to secure what is pleasing and beneficial, and to remove what is not pleasing, hurtful, or less useful, or by the desire to satisfy a want belonging to the category of instincts or quasi instincts.

It is to be noted that both in determination and in choice the greater probabilities favour the working of the mechanism most accessible to movements, which implies that such mechanism has already been at work, and therefore should offer less resistance to the psycho-motor tension. It is in this way that habits of conduct are formed, and thus we explain the difficulty of new psycho-motor organizations, which always fall to the strongest organisms ; whilst the difficulty of breaking off habits is the reason of individual and collective misoneism.

The question of free-will is therefore reduced to all the factors of will with choice :

1. Number and value of intellectual syntheses.
2. Degree and value of emotive syntheses.
3. Contrasting emotional-intellectual syntheses.
4. Degree of permeability of the motor paths and aptitude for the formation of new motor mechanisms.
5. Degree of the psycho-somatic sensibility of the ego, which has a tendency to follow habitual paths.

Voluntary movement finally requires the representation of the image of the actual movement, without which it could not be completed ; but, the analysis of this factor belonging rather to physiology and nervous semeiology, I limit myself here solely to the mention of it.

The pathology of will is perhaps the most important chapter of mental pathology, and for that very reason it is impossible for us to make a complete analysis of it here. When we consider that action is the last fact in a series of others, from which it necessarily arises and emanates as the resultant of converging and diverging forces, it is quite clear that voluntary action must partake of whatever defect or irregularity of function there may be in the various mechanisms from which it has its origin. Perceptive power, the powers of memory, attention, and association, the innate capacity for the formation of active intellectual syntheses, the degree of evolution of the emotion, all concur in forming the character of voluntary determination, and this, in its turn, gives character to the personality. Defective perception generates error of movement, which destroys the effect, just as hallucination furnishes the material of a judgment and of an intellectual and emotional syn-

thesis which in its turn gives rise to an action opposed to the fundamental law of the interest in conservation and development of the psycho-physical personality, which is always co-ordinated with reality. The sufferer from religious hallucination, who pursues theistic phantasms and preaches a reformation, or the erotic idealist whose consciousness is so filled with reflections upon the smile of a lady that he will run after her in the street, furnish examples of will with choice determined by anomalies of the formative process of judgment, based upon false sensory products. The persecuted subject who pesters the authorities for protection of his person and his interests, threatened by supposed enemies, or the melancholiac who commits suicide, perform acts of will with choice that are logical, because the direction of their choice is determined by intellectual and emotional mechanisms that have been profoundly altered. If in the mind of the melancholic subject there no longer vibrates even the faintest hope of pleasure, he thereby loses any reason for living, and there is only one way opened to voluntary determination—viz., that of suicide, which is the logical expression of the negation of personality: all the other channels are obstructed.

The famished boy who, under the impulse of the instinct of self-preservation and of affection for his sister, steals a loaf of bread to procure the unspeakable joy of satisfying the hunger that has tormented him for hours, and of sharing this joy with his beloved sister (Zola, *Le Travail*), performs an action that has all the characteristics of a choice that is logical and inevitable, just as homicide, in the case of a man whose consciousness is filled with the homicidal idea, against which he has vainly used every effort to protect himself (homicidal obsession), is unavoidable. In the boy no other circuits have been formed through which the tensions of will and the satisfaction of the instinct of hunger may be discharged. In the man obsessed by an idea, the circuits already formed in connection with numerous intellectual and emotional syntheses are obstructed, because the consciousness, invaded by the besetting idea, is closed to all these intellectual and emotive syntheses. Even when they penetrate to it, their value is insignificant in comparison with the high motor potential of the synthesis that rules as mistress in his consciousness. The conduct of the helpless or ridiculous imbecile, like that of the idiot who amuses himself by spreading fire, is the equivalent of the doings of the criminal who lacks the higher emotional syntheses and the aptitude for the formation of new circuits that will facilitate action less instinctive and more beneficial to himself than theft or robbery.

Where the intellectual and the emotional syntheses are wanting, or are not sufficiently active to charge the motor mechanisms with the potential necessary for action, there we have imitation or

suggestion, both of these in weak natures—neurasthenics, phrenasthenics, hysterical subjects, and demented persons.

Pain, which is paralyzing, obstructs all the motor circuits, because it forbids the penetration of the intellectual and emotional syntheses into consciousness, and we have *aboulia*, the lack of will. If the syntheses are dissociated, as in mental confusion or in amentia, there is also *aboulia*, because all the ideo-motor mechanisms are broken, and there remain only the instinctive mechanisms, or some of these, or whatever new formation connects itself with a hallucination or an ideo-motor residuum of the old personality. Here, too, there is *aboulia*, due to another cause.

If the ideative synthesis lack the colouring that should come to it from the numerous nutritive channels of the unconscious, because the laboratories of the latter are giving a scanty product, as in neurasthenic subjects, the potential that determines the action is weak, and the action remains in consciousness as a desire that slowly vanishes—it is another form of *aboulia*; and if in hesitating persons, who are also neurasthenic, none of the various ideo-motor mechanisms in contrast reaches the degree of tension necessary for discharge, the action remains latent, and in this result we find a defect or an anomaly of will.

If, on the other hand, the intellectual syntheses are highly coloured, as in morbid gaiety, mania, and progressive paralysis, and if these syntheses succeed one another rapidly in their passage through consciousness, being continually formed and resolved, the will reflects on the action of these sufferers a volubility in proportion to the rapidity of the intellectual formations, and this explains their inconsistency and their inefficacy.

The obstinacy of will displayed by some persons arises most frequently from insufficient formation and representation of other intellectual syntheses and motor mechanisms than those that have won a favoured position in consciousness and are therefore predominant. The impulsiveness of the epileptic depends upon the extraordinary charge of one intellectual-emotional formation—generally of low type and already preformed. The discharge takes place under the slightest external stimuli, and may appear to be voluntary.

If the motor mechanisms of a low type tend to autonomy, breaking off relations with the intellectual syntheses that first determined them, we have tics, automatism, and compulsions—all forms of *aboulia*.

In general, the will acts through an extraordinarily large series of circuits, the extent of which varies very much in different individuals, according to the degree of evolution and the transformations induced by mental disorder. These circuits run from the smallest, for the satisfaction of individual instincts, to the largest, intended

for the exclusive use of the social ego. The former are the oldest, the latter somewhat recent. The one series has its culmination in the past, the other in the future; but the will has always essentially the same characteristics, and we must seek its anomalies in the mental organization and in the influence that the various components of which the mind is constituted exercise in the formation of the motor mechanisms.

To speak of the various forms of pathological will would be to take the reader over almost the whole course of insanity in the individual and in the social world, and the task would be a useless one. After what we have said, each student will easily form the synthesis of the pathology of will when he has read the third part of this work.

CHAPTER VII

CONSCIOUSNESS

CONSCIOUSNESS is a representative or reactive perceptive moment connected with the past experience of the personality. It varies in its continuity just as the percepts and mental representations, as well as the emotions constituting its domain, vary. It is a small part of the somatic and intellectual being revealed to itself at a focus, upon which the mechanism of illumination is kept active by all the obscure and deep-seated laboratories of the memory : it is the *ego* differentiated from the world ; all the more so the more extensive the knowledge, and the greater the number of psychic syntheses formed by it. We are thus entitled to say that consciousness is co-extensive with notions and reactions.

Psychologists, like James and Mercier, speak of a somatic ego, of a spiritual ego as distinct from the foregoing, and of a social ego that comprehends the thoughts, the emotions, and the actions of man in relation to his social environment. These are scholastic distinctions, to be accepted only because of their utility in enabling us to understand the various aspects of the ego. For example, I cannot represent to myself my somatic ego, unless as associated with the emotional and intellectual phenomena, even with the most elementary of these, such as those of space and of relations in space.

The somatic ego, that which we suppose to be constituted by the syntheses of all the obscure nerve-waves that reach the brain from all points of the body, cannot be represented otherwise than with the assimilation of intellectual products resulting from the contact of the organism with external agents. The action of these latter gives rise to an extremely large and varied series of modifications of the organism, and, at the same time, to another equally varied series of percepts and their compounds, whence the mind is formed. The spiritual ego, the result of these last, is the arborization of the first grafts from Nature into the senso-somatic trunk, their buds being nourished by contact with the environment and with the sap of the trunk, whilst at the same time they send

into the deepest subterranean reservoirs many products of their transformation. It is in this way that there is established the continuity of the somatic ego with the inseparable spiritual ego, each of the two becoming an essential condition of consciousness. All percepts, associative products, syntheses, new or old intellectual constructions, the ruins of old edifices, all the emotional experiences and forms of reaction, from the simplest reflexes that are hardly noticeable to the instinctive and the multiform actions operating on the social environment, concur in one single synthesis, which is the *ego*. It is illuminated only in some of its components, but it is to be recognised, in its historic entirety and in its synthesis as a whole, always differentiated from that of other beings, the more entirely so the fuller its knowledge of its environment and the greater the number of its own motor experiments upon the world.

The somatic consciousness, therefore, is not differentiated and representable in its *ensemble* and in its parts except through the relations of the body with the external world—that is to say, through sensations acting outwards. All the perceptions concur not only in the formation of the intellectual consciousness, which is formed essentially of percepts, of their syntheses, and of their varying combinations, but also in the formation of the somatic consciousness, in so far as every perception contains the somatic element that is furnished by the contact of the body with external agents, of which the expression is found in percepts. Just as visual, aural, tactile and other forms of consciousness are formed from the respective intellectual components, and the innumerable syntheses from the products of the sensory areas, the great trunk of the somatic consciousness is nourished by the somatic elements, and in its turn this consciousness will maintain very intimate relations with that portion of the intellectual formation most fully nourished and most easily representable. Thus it is that we have the prevalence of a certain different tone in visual, aural, and motor subjects.

Besides the intrinsic modification of separate parts of the body by the external agents that furnish formative elements of the somatic consciousness, we must mention all the emotional experiences of pleasure and pain accompanying sensations, which are reverberated, as we have already explained in the preceding chapter, partly into the field of intellect and partly into the field of emotion; for it is well to remember that the body participates intrinsically, with the somatic phenomena, in the emotion and in the advantage that the personality derives from external agents, or in the hurt to which it is subjected by them.

In the formation of the somatic consciousness there is a strong concurrence of motor reactions, from the simplest reflexes to the most complex actions in the social relations of each individual. Every voluntary movement, besides the psychic mechanism of which we spoke briefly in the preceding chapter, contains all the

somatic elements—tactile, muscular, articular, and the sense of innervation—that furnish the image of the movement to be made, and that are reinforced by the images of already completed movements. Motor experiences, especially those involving effort, are the largest contributors of elements to the somatic consciousness, which is fused with the intellectual, the emotional, and the voluntary consciousness, and can hardly be represented. When we perceive, think, are moved, or act, we represent to ourselves the object of the perception, the thought, the emotion, or the end to which our will and action are directed. Except in strong emotions, the somatic consciousness almost always remains behind the scenes of our psychic life. Exposed to view, however, is the perpetual movement of what we know, what we think, what moves us, what we desire, all those other things to which we aspire, and which we wish to procure or remove from us. Under the various circumstances of life the scenes succeed one another with contents at one time more intellectual, at another more determinative. Consciousness changes as thoughts, emotions, and aspirations change. The distinction of a somatic, a spiritual, and a social ego, and the sub-distinction of a religious ego, an æsthetic ego, etc., are therefore more than scholastic. It is the necessity for analysis that induces us to distinguish forms of personality that cannot be realized. The psychologist must penetrate into the inmost structure of the *ego*, because consciousness is a synthesis of all the components of the mind, and changes with the movement of these components as they pass the illuminated point. It is the frequency with which certain preferred components return to the illuminated point that gives the personality its particular tone or character.

If a man has the conviction of the existence of God, although he has no personal experience of his relations with Divinity (and therein lies the essence of faith); if he submits to all that he believes to be the will of this Supreme Being, obeys all His commandments, and in all circumstances and vicissitudes of life derives the rule of his conduct from that belief, we say that that is a religious consciousness, be it moral or not, provided it arises from the relation of the *ego* with the Divinity believed in.

We may speak of an æsthetic consciousness if there be penetration of the ego into the sense of things, with harmony of forms and colours and with rhythm and harmony of sounds. In intensification of the æsthetic consciousness there is detachment from everything else, in order that there may be complete absorption in the object of beauty. So, also, may we speak of the moral consciousness, religious or not, of the man who acts rightly, and whose social relations are always for the benefit of his fellows. These syntheses, however, are the effects of the prevalence of some of the contents of consciousness over others, and of survivals of the same in the continuous movement of the psychic components of the personality.

We might also consider that there is a social consciousness, not in the sense of religion or ethics, but in the sense of human groups constituted for definite purposes. Commercial and industrial societies, political associations and groups, the more extended associations, such as those of students, the army, the magistracy, legislative bodies, etc., are social groups in which we notice a certain uniformity of consciousness which emanates from the object for which the social group has been constituted, and which, in its turn, determines a certain affinity of conduct that creates similar habitudes.

To this factor of the social consciousness is to be added that of imitation, which arises from the frequent contact of men associated for a common end under almost equal conditions. Sometimes what appears to be imitation is an imposed rule, as in the army, and for this reason we cannot wholly adopt the concept of Tarde, who defines society as a circle of imitation. At the utmost, that might be said of excited crowds. Neither could I adopt the idea of Le Bon, who thinks that the crowd is the only social group, for this reason, conspicuous among others, that emotivity and impulsiveness prevail in a crowd, and in its components there is a form of social consciousness rather imitative and obscure; whilst for the social groups of which I have already spoken there exist fixed common ends, far-off aspirations, and great intellectual labour, ordinarily with the development of action beneficial either to the particular group, or, more commonly, to a wider section of human interests. In the social consciousness, therefore, it is not imitativeness that prevails, but community of ideas and of sentiments; and if the crowd is a servile herd (Le Bon), it has only one form of social consciousness, which varies according to the ends of life, just as there is variation of the relations of the *ego* with the other egos of the innumerable social groups. In the social consciousness, which consists in the physiological fusion, in each *ego* of the group, of the ideas, the aspirations, and the conduct of other egos, we must take account of the element of *opposition* which comes from those individuals who have the strongest conception of ideas, means, and ends different from those of the group, who do not yield to the power of imitation, who break up the habitudes of the group, and direct its action into other channels. They open up new paths of conduct and become centres of the imitative actions of the whole group, or they separate from it and constitute a fresh group. The element of opposition in the social consciousness of a group is often the germ of new factors of social consciousness, and in their development we have one of the causes of progress.

The distinctions of somatic ego, intellectual ego, and social ego, under whatever form we may consider them, are only aspects under which we may examine consciousness. In every case we must divide consciousness into two parts, the illuminated and the obscure.

The illuminated part is the so-called *visual field* of consciousness. We know that it can contain only a small number of representations, and therefore it is easy to conceive how, in any unit of time, the great mass of notions and of emotive-motor experiences of the personality must rest in a much larger field which is not illuminated. The illuminated and the non-illuminated field together constitute an organic whole, the latter field furnishing to the former all that has been preformed or is actually forming in the most diverse combinations, as we have said in one of the foregoing chapters.

The illuminated field presents the conditions best adapted for maintaining the contact of the *ego* with the external world, and for utilizing, through these relations, the whole patrimony of the psychic personality conserved in the non-illuminated part—that is to say, in the *unconscious*. In other words, ‘the unconscious’ supplies to consciousness all the data of the individual history essential for useful adaptations of the personality to its environment. The illuminated field is also a place of preparation of instantaneous syntheses and of new reactions, but this work of synthesis is not unknown to the more profound and obscure departments of the unconscious. Normal relations with the external world, attained through the illuminated field across which all objects in the world pass for their spiritualization, involve the putting of the *ego* into relation with reality, and actual reality into relation with other past realities constituting the experience of the *ego* at successive times. To the illuminated field invariably belongs the control over the products of the workshops of the unconscious when these come into relation with reality.

In ‘the unconscious’ there are preserved not only perceptive-emotive historical realities, but also intellectual and sentimental syntheses, and, further, all the ideo-motor and senso-motor associates, so that series of movements may be effected independently of will and of consciousness, because there are preformed ideo-motor mechanisms.

When there appears in the illuminated part of consciousness any intellectual synthesis, such as an object of study, a state of emotion, or an interest, and the order for action is given to the laboratories of unconsciousness, work is immediately begun, and the product comes forth sooner or later into the illuminated field, more or less perfect in proportion to the wealth and the efficient organization of the unconscious. If a scholar studying a lesson in the evening cannot then repeat it, yet during the night dreams of what he could not remember earlier in the evening and recollects it perfectly next morning; and if a student who, owing to some obstacle to memory, cannot remember a word rises from his work, wanders about, and thinks of something else until at some favourable moment—perhaps the next morning—the word comes to his

lips, it is certainly 'the unconscious' that furnishes to consciousness all that he has been seeking for.

The speech of an orator who improvises and the genial thought that surprises consciousness itself are most irrefragable proofs of the work of 'the unconscious.' Walking and avoiding contact with persons while attention is concentrated on some other matter; writing a word that one has thought of or seen while the illuminated focus is occupied by something else; the unconscious or subconscious movements of mediums, not due to hazard, but following a logical direction that proves the existence, alongside of conscious thought, of another collateral thought outside of consciousness (Janet, *Automatisme psychologique*); the words written by the hysterical woman in whose anæsthetic hand a pen has been placed in position for writing, without her perceiving it or knowing anything of it—all these are common examples of the activity of 'the unconscious.' It is in unconsciousness that the formations of delirium are prepared and organized, that they assume associative relations and raise the potential of the sensory zones, producing hallucinations as a result. It is to 'the unconscious' that are relegated these syntheses of contrast that have a tendency to invade the illuminated field of consciousness. It is 'the unconscious' that furnishes the images of dreams and the plastic pictures of hysteria and of somnambulism. 'The unconscious' is the great architect of good and of evil, of genius and of folly, and the majority of mental affections have their origin in it.

Consciousness, considered as a whole, has its anatomical substratum in all the cerebral mantle. We might speak of as many components of consciousness as there are qualities of the outer world perceived, these qualities corresponding to the sensory areas of the mantle and the forms of reaction of the tactile-motor zone. If, therefore, there exists a cerebral area in which the fusion of the products of the sensory zones takes place, and the intellectualization of the fundamental emotions; if, as a matter of fact, the intellectual-emotive and the motor syntheses evoke their separate components from their respective sensory seats, which hold themselves in readiness for orders from a superior centre; if there is a field in which the syntheses of contrast are formed and the motives of action are balanced in the presence of desire; if logical thought passes over the illuminated field, controlled by reality, present, past, or future (imagination), that cerebral area—of which we presuppose the existence—in which these high functions are performed, is the area of the frontal lobes.

I have already said in the first part of this work that the frontal lobes reassume, co-ordinate, and control the work of the sensory and motor zones. The power of the personality arises from the

relations of co-ordination, subordination, and discipline existing between the sensory and motor zones and the frontal lobes, always supposing that the whole mantle has reached its normal development.

In the degrees of formative and conservative power of the sensory zones, in the extent of the power of synthesis, and in the degree of co-ordination and subordination of the sensory products to those of the mental syntheses, we may recognise gradations of consciousness. The predominance, in their reciprocal relations, of the sensory areas over the area of synthesis and control, which gives the norm to life, is the highest and surest note of degeneration. Now, it is evident that, if the premises are sound, the chief centre of consciousness, coinciding with the portion of its field that is most highly illuminated, must correspond with the frontal lobes. I would offer the hypothesis that the sleep of the normal man depends upon those lobes being in repose. During sleep the sensory zones operate in a disorderly fashion, being without control in their relation to reality (dreams). In somnambulism the frontal lobes are probably subordinated to the power of the sensory zones in activity. These latter may even furnish some of the syntheses that are at the service of the sensory images called up, some of them of extraordinary vivacity—hallucinations, recollections. Perhaps the amnesia of the somnambulist is to be explained by the awakening to life of the frontal lobes that have exercised no control during the somnambulism (just as they exercise none during sleep), and have evoked no images (amnesia in duplication of the personality).

Hallucinations are, at bottom, only the result of the predominant functional activity of the sensory zones, whose products not only elude the control of the frontal lobes, but very often subject the frontal lobes to the controlling power that they exercise over the whole mental life. The small circuits of human action, automatism, instincts, ideo-motor and senso-motor reflexes, are more accessible when there is obstruction of the large circuits that pass through the centre controlling the syntheses—that is, through the most highly illuminated part of the field of consciousness. There alone the motives are in contact with counter-motives (syntheses inhibiting action, and syntheses directing action).

In deficient development of the frontal lobes and of their functions, and in inharmonious relations between them and the sensory areas, we may find the anatomico-physiological substratum of a large group of mental maladies. Many forms of insanity are simply the effect of the infraction of the laws of co-ordination and subordination of the separate parts of the mantle. The tracts of the mantle that are in rebellion introduce new components into consciousness, and withdraw the personality from the rigorous control of reality, or they forbid or lead astray its normal action. In sensory insanity, in paranoia, in obsession, in delinquency, it is clear that the mental

proletariat is in rebellion against the ruling powers of the mind, which may have become enfeebled or decayed ; or the rebels may be new products that transgress the laws of co-ordination and subordination.

Consciousness, therefore, is mutable. The conditions of its normal changes are determined by contact with present reality on the one hand, and by uninterrupted relations with its own history on the other. Action that has been deliberated upon in the luminous field of consciousness draws from the perception of reality, and from the past history of the consciousness, the attributes of utility and of beneficiality. It is in this way that the character of the personality is maintained. Mental disorder, independent of the degree of evolution of the consciousness, is the detachment of consciousness from reality, or the separation of the actual consciousness from its past experiences.

We shall find this fundamental conception always applicable in the study of mental affections that we are about to enter upon. To the analysis of these affections the third part of this work is devoted.

PART III

CHAPTER I

METHODS AND FIELD OF CLINICAL INQUIRY

THE exposition of psychological phenomena and their teaching given in the second part of this treatise reflects general psychology, normal and morbid. In this third part it is our aim to translate the facts and laws of general psychology into what is known as individual psychopathology, since in each individual case the task of the physician is to reconstruct, in a mental synthesis, the diseased personality in front of him, taking into account the social grade of each individual and the amount of instruction received.

Such a supreme object on the part of the psychiatrist may be attained by means of (1) the psychological examination, dependent upon the interrogation of the supposed patient; (2) by the reconstruction of the individual and family history; (3) perhaps also by an inquiry into the environment; (4) the anthropological examination; (5) the minute functional examination of the nervous system; (6) the examination of the entire organism, taking into account the multiple, mediate, and immediate relations existing between structure and function, both of the cerebrum and of all the other organs, inasmuch as all these in synthesis reflect the personality.

The first task of the physician, then, is the psychological investigation, which rests for the most part on the interrogation and the knowledge of the history of the person being examined, and also on his conduct. The individual concerned may, unconstrainedly and with the utmost good faith, express his whole mind, with all its anomalies and disturbances, omitting nothing; he may, however, simulate or dissimulate, or, again, maintain an attitude of silence, no matter how much he be questioned.


In every case the skill of the physician lies beyond all else in not allowing a single word to escape, not an act, not an attitude, to pass unnoticed. Every movement has its language and its significance, every word must be watched.

The interrogation should be so directed as to gauge the principal

mental activities which we have expounded in the second part of this work ; but it is unnecessary to follow a precise and identical order in every case, the important thing being to investigate fully and well. We may commence with the examination of the consciousness and the personal identity. What I have written of the consciousness may be our guide. We have the constituent elements of the ego, which, according to Guislain, must be the guide of the physician in his interrogation of the patient. We must construct it, then, with a series of questions : What is your name ? What is your age ? What trade or profession do you follow ? Are your parents alive ? Have you any relations ? Are you married ? Have you any children ? Where do you come from ? or where do you live ? How, and on what, do you live ? Have you any belongings ? How many ? and where are they ?

Once we have obtained the general details that furnish the elements for the identity, one of two methods may be followed : we may allow the patient to speak, drawing him into conversation, if at all possible, upon whatever subject seems most appropriate, in which case it is evident that the physician, if he is familiar with such patients or if he has had a good indication of the patient's peculiarities, after a longer or shorter conversation, will be in a position to appraise the perceptive capacity, memory, attention, ideation, etc. ; or we may adhere to a series of questions, more or less stereotyped in the mind of the alienist, these also being disposed in groups corresponding to the different forms of mental activity, the perceptive, mnemonic, attentive, ideative faculties, etc. In any case, no matter what the method preferred, allow the patient to speak whenever he shows a tendency to do so. As a rule, the person under examination does not wait for the physician to produce all his formulary, but speaks for himself even more than the physician expects or desires.

When I think of the great variety in the behaviour of the insane, or those supposed to be such, I am led to regard as almost useless the formularies recommended by worthy psychologists—*e.g.*, that of Ferrari, in favour of which many good arguments were advanced at the Phreniatric Congress at Naples, 1899. Nevertheless, if the patient speaks only when interrogated, some method indeed must be followed ; every question must have its object, and it is wise to have a definite plan.

 In such a case Ferrari's method is to be preferred :

1. What is the perceptive capacity of the individual under examination ? In this examination we proceed from the simple to the complex, following out practically the law of progressiveness. I myself employ a number of wooden cubes of various sizes and colours, with letters and figures of common objects or animals on them, placing them before the patient, and inviting him to recognise forms, colours, and figures ; then he is questioned concerning objects

round about him, and their use ; next concerning persons and their attributes ; then as to the place (here we enter into several particulars) ; lastly, concerning the day of the month and year. In this way we judge not only of the perceptive capacity, but of the orientation, or, rather, of the appreciation of self in time and space.

In putting these questions, we must note carefully whether the patient's mind becomes distracted, whether he says anything in an undertone or looks towards some other point, thus suggesting the presence of hallucinations ; or we put some questions to him in this regard : Do you hear any voices ? Do they sing to you ? Do they insult you ? Where do they come from—from the room, from behind the wall, from the roadway ? Have you any visions ? Are they of persons, animals, or supernatural beings ? What attitude do they assume towards you ? Do you have any dreams ? Are they fearful, happy, or significant ?

2. The examination of the memory is next taken up, and is effected with the aid of appropriate questions : How old are you ? Where were you educated ? What were your teachers' names ? your father's, mother's, brothers', and sisters' ? Where do you live ? Did you live in any other house before this one ? How long have you been in the asylum ? Who brought you here ? What doctor first examined you ? Where and how did he examine you ? What treatment have you received ? What relations or friends have come to visit you ? What kind of food had you yesterday, and for the last few days ?

3. We then pass to the examination of the ideation, inviting the patient to form a series of reasonings, which are also intended to measure to a certain extent his attentive capacity : Why did you prefer your present trade (or studies) ? What do you think of your confinement in the asylum ? Why have they sent you here ? What do you intend to do when you get away ? What are the nurses and the doctors doing for you ? Why did you do such and such a thing ? What object did you wish to attain ? Are you better here than at home ? How much is necessary to support your family in a proper manner ? Whence do you procure the requisite funds ? What is your income ? What do you get for your work ? Which of the members of your family assist in the maintenance of the house, either with income or with work ? To what extent ? In what manner do you expend this sum ? Give a calculation of the cost of living, of the house rent, of clothing, and the amount necessary for the education of your children. (It is very natural that the examination should vary as regards this scheme of judgments, comparisons, calculations, etc., according to the degree of culture of the individual. If we have in front of us a literary person, we will bring the conversation round to some author and to literary questions ; if he is a traveller, we will invite him to express judgments on the countries he has visited, upon distances, etc. ; if a

peasant, on the methods of agriculture, on the crops, the rent, the leases, etc.).

As a rule, the individual under examination, in the course of his replies, even when he does not spontaneously manifest his false ideas, gives some indication for the more direct investigation of deliria, which presents some difficulty only, or almost only, amongst paranoics. To them we must put our questions in such a way as not to show any apparent interest in knowing their affairs. To the common questions, Have you any enemies? What are your relations with the Divinity? etc., only the paranoics of long standing reply, precisely those who experience no difficulty, because they no longer have any reason to be silent or self-contained.

At the outset of the illness there should be a special conversation with the patient, having for its object the investigation of the deliria. The alienist must exercise the greatest skill and tact in order to insinuate himself successfully into the mind of his patient; he must wheel him round, and attack him from every side, for it is neither advantageous nor commendable to approach the patient with a stereotyped formulary of interrogations.

The interrogatory for the investigation of the state of the sentiments and emotions is somewhat more difficult and less promising, since the affectivity must be judged by the patient's behaviour and actions, besides the relations he maintains with his family, in his office, and in his social environment, rather than by the verbal replies of the supposed lunatic; sometimes it is necessary to surprise the behaviour and attitudes of the person under examination at different hours, both day and night. Grief, fear, joy, anger, suspicion, pride, hatred, are revealed by other means than the interrogatory. He is a very ingenuous physician or judge who thinks he can penetrate the darkest depths of the human mind with four questions, be they ever so crafty and insinuating. The sentiments present the largest field of simulation, dissimulation, falsehood, and all those artifices which must serve to cover ugliness of the mind of the human being, just like the cosmetics which serve to cover the uncomeliness of the fading complexion of a conceited woman. The questions serve, at the very most, to let us know whether the individual under examination has or has not *moral notions*—a very different thing from moral sentiments (*vide* Chap. V., p. 362 *et seq.*). Ask a person under examination, 'Do you love your mother?' and he will invariably reply 'Yes' (when it suits him to reply), even when that 'yes' stands out in contradiction to the numberless griefs inflicted by him on his mother. 'Are you aware that the property and the wife of another are to be respected?' The invariable reply is, 'Certainly.' Such a reply may be given perhaps by a professional thief or a professional bully. The sentiments are better investigated by other means than questions. We must draw the elements for our judg-

ments from a very different source, for, whatever the replies given by the patient, they have to be put into quarantine to await control in the story of his life and conduct, which story should be carefully collected and recorded. His conduct and behaviour in the family circle and in the social relations will furnish all the data for a judgment on the emotions and the sentiments. We must inquire also if the individual under examination had a tendency to melancholy or was of a cheerful disposition ; if he was fond of solitude or was of a sociable nature ; if he was inclined to be silent or to stammer ; if he was timid, courageous, or bold, calm, irascible, or choleric ; if modest or proud, suspicious or assured ; if fond of, or indifferent to, his family ; if fulfilling his duties and adapted to the discipline of the family, the school, or the office, or negligent, undisciplined, deaf to appeals ; if respectful to others and of others' property, or egoistic and insensible to the sufferings or interests of others ; if cruel to, or sympathetic with, men or animals ; if he was religious or not (taking into account the domestic environment), and especially if he had ascetic tendencies ; how he esteemed friendship, how the instinct or sentiment of love was developed in him ; if an adult, how he fulfilled his social duties ; whether he had an artistic temperament, etc. With regard to one sentiment alone is it necessary to pursue inquiry with the aid of questions, and that is the kinæsthetic sense : How do you feel ? Are you suffering from anything ? Do you feel strong ? Are your legs able to carry you a long distance ? Do your hands serve you with their accustomed, or more than their accustomed, ability ? Are you passionate in love (if a man) ? Do you ever suffer from headaches, or from oppression in the region of the stomach ? Have you a good appetite ?

The inquiry is then prosecuted by the examination of the motor determinism, suggested, commanded, and spontaneous. The insane assume a number of strange attitudes, and perform illogical acts to such an extent that it would be impossible to pass them in review. During a visit to an asylum ward, no matter how little the vigilant discipline may be relaxed—discipline whose aim is to hinder certain manifestations and to reconform the abnormal or illogical tendencies to the ordinary rules of life—it frequently happens that a patient may be seen sitting up in bed, her face in her hands, and her hair untied, or carrying on an imaginary conversation in a low voice with a vision of herself, her eyes turned towards one corner of the room or to the window, or crouched and self-concentrated, or skipping merrily round you, or kneeling to kiss your feet, or cursing from afar, or collecting every possible thing—paper, rags, scraps of food—and filling enormous pockets, which have to be emptied, or performing the toilet, decorated with rags and ribbons of the most striking colours, strangely disposed among the hair and the clothing, or standing at the bedside undressed, exposing the genitals (most frequent in women), etc.

All these attitudes and all these actions are only reflexes of the new orientation of the personality, of the predominating emotions and false ideas, of repeated sensory disturbances, or else they are motor stereotypes, traces, residua, of a new and abnormal mental organization, which also becomes dissolved.

A patient in the clinique at Palermo, from morning till night regularly every six or seven minutes, used to attack the garden wall, using one hand as a shield and with the other brandishing an imaginary weapon, advancing with angry threats and his head inclined in the attitude of an athlete or a duellist, then retiring quietly to his place. Another used to cry out frequently during the day, but especially in the morning, with all his might, 'I am the Lord of the world!'

We must take account of all these manifestations and all these attitudes, each of which is, as it were, a stone which serves for the construction of the diagnostic edifice, and which assists us in reconstructing the story of the illness, and in portraying the character of the personality as it existed previous to the illness.

Next we investigate the conative activity. The patient may be ordered to perform a series of more or less complex movements: Stand up! Walk in that direction for ten paces! Raise the right hand! Carry the chair to that corner! Write your name! It will be seen that one does not make any response at all to the command; another obeys in part, and stops; another fulfils a different act from that ordered; another looks at you with a frown; whilst others obey with more or less activity.

Next we pass to another order of psychological investigations, which can only be fulfilled in large institutions. To this inquiry, as may readily be understood, only a few patients lend themselves.

We measure the time of reaction under diverse stimuli—tactile, acoustic, visual—likewise the time required for selection, and this also gives a measure of the attentive and perceptive capacity, by complicating the stimuli. For this purpose the chronoscope of Hipp or Arsonval is of great service. For the measure of the memory we investigate the fixative capacity and that of conservation (retentive). We present to the person under examination series of letters, syllables, words, or figures for a determined time, and invite him to repeat the series (whether seen or heard) in speech or writing, after some minutes, after the lapse of an hour, after several hours, and late on the following day.

For the measure of attention in everyday practice I have some time preferred Münsterberg's method, which consists in inviting the patient to trace simultaneously vertical lines with the right hand and horizontal lines with the left. In proportion as the attention becomes fatigued we get a measure (with a chronometer or a pendulum or a pin working on a Facault cylinder on which has previously been traced the time of a diapason at fifty vibrations

per second) of the time between the commencement of the movements and that of distraction. When the movements of the two hands tend to have the same direction, vertical or horizontal, distraction commences, and the time of attention will be measured by the distances of the threshold of fatigue which can be represented in comparable diagrams.

As regards ideation, in addition to applying the interrogatory, it is well to measure the associative and imaginative capacities.

In the case of the associative capacity, the simplest method is that of pronouncing a word or showing it for a second or two in the camera obscura of Buccola, illuminated by a Geissler's tube (experiment of Guicciardi and Dandolo), or of writing it before him. The individual under examination should pronounce in a determined time (forty to sixty seconds) all the words that reflect images revealed by the word heard, shown, or written. The number of images reawakened (it differs greatly in the three methods for the same individual) gives the measure of the associative capacity in the given unit of time, and may be put into the form of an equation in which the denominator *as* is divided by the time *s*. For the imaginative capacity we can follow the method of the ink-spots of Dearbon (*vide* p. 312).

The measure of the emotions—that is, of the fundamental emotions—is obtained by means of tracings of the respiration (pneumography) and of the capillary circulation obtained with the gauntlet of Patrizi, which is rather easier in application than Mosso's plethysmograph. I will reproduce some of these tracings when dealing with the individual forms of disease.

The ergograph is a good and relatively easy means of investigating the measure of voluntary muscular energy and the manner of its manifestation. The ergographic tracings vary greatly in the various psychopathic forms, and may serve also as proof-tests of the modifications the disease is undergoing, as well as a means of instruction.

The psychological examination is completed by the writing of the patient, whenever possible. In no other way does he so clearly reveal his thoughts as in writing.

The superficialities, the incoherencies, the paradoxes, the deliria, the amnesiæ, are well brought into evidence. The writing of the insane person, as indeed of anyone of whom a psychological examination is desirable, is always a precious document to the psychologist.

The psychological examination which every experienced physician attempts to execute on the lines traced above, even when he has at his disposal the very best means, is gradually completed by the functional examination of the nervous system. All the forms of sensibility should be investigated; all the special senses, as well as the mobility and the state of the muscles, the superficial and

deep reflexes, etc., should be examined, nothing being excluded. None of the facts belonging to the semeiology of the nervous system should escape notice, inasmuch as every one of them can furnish some datum for the more precise cognition of the subject examined.

For the particulars concerning the signification of the individual symptoms, and the methods for the most rigorous investigation of these, I must of necessity refer the reader to the special treatises on the semeiology of the diseases of the nervous system (Bianchi, L., *Semeiotica delle malattie nervose*; Morselli, *Semeiotica delle malattie mentali*).

Particular attention must be paid to the so-called degenerative anthropological signs. Taking into account race, climate, and epoch, the human form presents particular characteristics, on the recurrence and grouping of which depends the normal type of each race.

Anything in the configuration of the individual that constitutes a deviation from the mean type of the race, that exhibits characteristics of inferior races or even of higher animals, or produces irregularities or asymmetries, may be considered as a characteristic of degeneration. It is well, however, to come to an understanding as regards these signs of degeneration, inasmuch as we will not classify among degenerates an individual who bears only one of the so-called degenerative stigmata. Only when these have a very high value *per se*—as, for example, microcephaly or hydrocephaly—can we speak of degeneration or of an anomalous or morbid anthropological constitution. An individual cannot be regarded as a degenerate unless he bears many degenerative signs, from the sum total of which he appears manifestly to be an inferior and anomalous type. Apart from distinct exaggerations, a solitary degenerative sign, such as we may meet with in the majority of healthy individuals, does not constitute an element in anthropological judgment.

According to Marro, such signs of degeneration may be divided into three categories: (1) Atypical; (2) atavic; (3) pathological. The atypical characteristics are simple deviations from the ordinary type of the race; the atavic signs are reproductions of old forms that have disappeared with evolution through series of generations; the pathological characteristics are the consequence of morbid processes which leave more or less distinct deformities. These three groups may be reduced to two, since the atypical is most frequently either pathological or atavic; the first and second groups, however, give a proportion numerically inferior to the third, for the investigations of Virchow, and others after him, have given ample evidence that the pathological processes, especially deviations in the process of ossification of the sutures, rickets, and diseases of the foetus, are a cause of more or less pronounced anomalies, and are relatively frequent.

I give here a brief index of the more important degenerative

signs that must be sought for in each case, referring to the work of Lombroso (*L'uomo delinquente*, ultimo ediz., and *Recherches d'Anthropologie criminelle*), Angiolella (*Manuale di Antropologia criminale ad uso dei medici*, 1897), and many others, for the methods of investigation and for a more systematic study of the subject.

Stature.—With respect to stature, it is necessary to note the presence of dwarfism and giantism, besides an excessive length of the span of the arms (measured from the extremities of the middle fingers with the arms stretched out horizontally at the level of the shoulders), the measure of which is normally equal to the stature.

In the Cranium.—The total circumference (passing over the glabella above the superciliary ridges, and through the occipital point), inferior in man at 54 and superior at 58 centimetres; low, receding, or narrow forehead (stenocrotaphia); flat occiput; marked asymmetry, such as frontal or occipital plagiocephaly; oblique cranium (Lasègue); scaphocephaly, oxycephaly, trigonocephaly, platycephaly, ultra-dolicocephaly, and ultra-brachycephaly (crania too long or too large), are all anomalous.

The cranial capacity, approximately estimated, may be too low (below 1,400 c.c.) or too high (above 1,600 c.c.).* In taking these measures, it is necessary to take account of those degenerative signs that are indicative of deficiency of the cranial capacity; among these are marked projection of the glabella, the superciliary arches (through abnormal development of the frontal sinuses), and the occipital protuberance, which sometimes is prolonged into two transverse crests, separated by a sulcus (torus occipitalis transversus).

In the Face.—Disproportionate size with respect to that of the cranium; protruding zygomata (increased length of the bizygomatic diameter); large mandible; lemurian form of the maxillary angles. With the disproportionate size of the maxilla there is frequently associated enormous development of the muscles of mastication, the masseters and the temporals; the insertion of these muscles is higher than usual, and their greater development assists in giving the illusion of a cranium larger than is really the case. Prognathism, either total or of the upper or lower maxilla alone, or simply alveolar, and exaggerated abnormal flattening (orthognathism). The face too small (microprosopia); facial asymmetry (plagioprosopia); the orbital apophyses projecting greatly; the root of the nose greatly hollowed; flat nose, deviated nose; excessively deep orbits; uni-

* We estimate this capacity by summing together the ciphers of (a) the maximum horizontal circumference, (b) the longitudinal curve (measured between the glabella and the most prominent occipital point), (c) the transverse curve (measured between the two auditory openings, passing over the vertex), (d) the maximum antero-posterior diameter (glabella to the most projecting occipital point), and (e) the maximum transverse diameter (between the most distant and projecting points of the parietal eminences).

lateral or bilateral microphthalmia; different pigmentation of the irides.

Ears.—Asymmetrical; the auditory canals, placed on two different axes in either an antero-posterior or a vertical plane; lop-ears, ears flattened out or otherwise deformed; Darwin's tubercle; sessile lobule.

In the Mouth.—Notable distance of the dental diastem (the distance between the two median incisors), or fusion of the two median incisors, giving rise to three instead of four (an anomaly I have met with on only one occasion); canines protruding far beyond the level of the other teeth; bad setting of the teeth; narrowness and marked arching of the hard palate; markedly flat palate; bifid uvula; wolf mouth.

In the Genitals.—Penis too small or too large; congenital phimosis; epi- or hypo-spadias; monorchism, or cryptorchism; absence of nemasperms in the semen (which I have met with more frequently than one would believe, even when coitus takes place regularly and the semen has the normal appearance); pronounced varicocele; small uterus or uterus bicornis; narrow vagina, or vagina divided by a septum; highly developed clitoris; hermaphroditism.

In the Trunk.—Thoracic asymmetry (Zuccarelli).

In the Skin.—Mongolian coloration; absence of hair, or hair long, thick, and shaggy over all the body; albinism; red skin.

In the Limbs.—Asymmetry in the length of the upper limbs; the fingers small and united to one another by a kind of membrane that brings to mind webbed feet (Penta); macrodactylism or polydactylism (Penta) in the hands or feet; rudimentary hand or foot, and other anomalies.

Here we have made mention only of the principal degenerative characteristics; for fuller details consult: Lombroso, *Uomo delinquente*; Virgilio, *Centuria di delinquenti*, 1889; Marro, *Caratteri dei delinquenti*, 1887; Tonnini, *Le epilessie*; Penta, *Annali di Neurologia*, 1894; and then Thomson, Carrara, Sergi, Tanzi, Benedikt, and as many others.

The anthropological examination and the functional examination of the nervous system, besides the psychological inquiry, should be followed by the medical examination. The alienist must not forget the genetic connection of many mental affections with pathological organic conditions. He must remember that the organic states exert a great influence upon the state of the mind and the currents of thought; that they concur in the constitution of the fundamental feeling which is a substratum of the whole psychic life—viz., the kinæsthetic sense—and that alterations of this feeling close certain paths to the emotions and thoughts, whilst opening up others; that vascular alterations have extremely close relations with the nutrition of the central organ of thought; that defects and deviations of the molecular interchange—the arthritic diathesis, diabetes, etc.—pro-

foundly disturb the disposition of the mind, the mental mechanism, and sometimes the nutrition of the brain ; that an impoverished blood cannot give rise to a cerebral function equally efficacious to that given, *cæteris paribus*, by normal blood ; that if the toxic products of the tissues do not become regularly eliminated they obtain entrance into the blood-stream, and are the direct and immediate cause of a large number of mental affections in predisposed individuals. The alienist is a physician—no more than a physician. He has in the insane person under his charge a diseased person, and nothing else than a diseased person, and the psychological and anthropological examination should complete the general medical examination ; with respect to other physicians, he has only a larger complement of culture and of professional and social duties.

Acquaintance with the family and the social and climatic environment is even more important to the alienist than to the general physician.

The family and the social environment prepare all the elements of insanity and other psychic anomalies ; these only require to be synthetized in the individual in the morbid clinical form, to which the physician then gives a name. The family is considered with respect to heredity and the environment it has formed for the individual. Disorder, lack of discipline, anarchy, dissoluteness, the evil example of outrages, or bad customs in families, have an influence in determining morbid phenomena that in many cases is even stronger than heredity.

The emotional natures, the litigious, intolerant dispositions which explode at the slightest opposition, impress, by example, on the growing mind of the child or youth indelible traces of morbidity, leaving there deep sulci which gradually become channels for the current of all the mental products that penetrate from the environment into the plasma of the personality, which takes on an anomalous development. This investigation is not merely a scientific display ; not only does it furnish a sure knowledge concerning the genesis of mental affections, but it has at the same time an immediate practical value : it opens up to the alienist physician paths for the most rational therapeutic indications. What curative and educative direction shall he impress on a young man ? Where should he advise him to live and be educated ? What psycho-organic vices are to be corrected ? What rudimentary instincts to be developed ? In what environment is he to be placed in order to bring about the desired result in a rational manner ? Therein lies a series of practical problems ; but it is well not to anticipate here what we have to expound in the chapter on the cure and treatment of the insane.

The inquiries into the family history of the insane or psychopathic individual are pursued in a most rigorous and complete manner. The reconstruction of the genealogical tree—trunk, roots,

and branches—is extremely advantageous, inasmuch as to no function is there more frequently transmitted the mark and characteristics of the progenitors than to that of the nervous system. Many coefficients can arrest morbid heredity, rendering it latent, or even making it disappear, but this happens much more rarely in the case of morbidity of the nervous system than of any other organ.

The individual inherits many of the characteristics of his parents and ancestors: the tendencies, the instinct, the emotivity, the intellectual force and the capacity of adaptation, sociability, special artistic and professional aptitudes, extravagances, eccentricities, tics, and obsessions, are transmitted, either in identical or in different form. Thus we come to know what morbid features belong to the individual, and what he has inherited from his family; to what extent, if any, the hereditary blemish has been aggravated or mitigated, and for what reasons. The genealogical tree is reconstructed at least up to the great-grandparents whenever possible, and should include collaterals and descendants. It is well known that morbidity of the nervous system may remain latent in an entire generation, and present itself again in an aggravated degree in the next; but if proper inquiry be made, it is found that even in these cases there is a certain mental weakness in the parents that escapes superficial analysis, especially of ordinary people.

The full knowledge we now have of these matters and rich personal experience indicate to us the wide limits of the investigation, inasmuch as it cannot be confined to the verification of the existence of an ordinary mental affection in the family, but includes also nervous affections of whatever entity, be it even simple neurasthenia, so common at the present day, or a circumscribed neuritis, such as a facial paralysis *a frigore*. The notion of the individual affection must be integrated in those of the family affections, and especially of the family character; just as there are families immoral, litigious, querulous, emotional, sexual, so there are those in which the credulous, the acritical, and excessively simple abound. The fact is that excessive meekness of mind is either a form of imbecility or borders upon it.

At other times we come across families composed of apparently intelligent individuals who have fallen from a high social position without any extrinsic coefficient; such a decadence is often due to a deficiency of judgment, to credulity, to susceptibility to suggestion, to defective aptness of adaptation in conduct, which proclaims a volitional and perceptive defect. Their intelligence is somewhat aerial and superficial.

Eccentricity, drunkenness, and delinquency are investigated with particular care. Eccentricity possesses a degenerative significance equal to and possibly greater than insanity (Maudsley, Morel, Ferè). Drunkenness either is itself an expression of mental weakness or of disease, such as dipsomania, or else it initiates the

family degeneration, producing the gravest forms of cerebropathy in the descendants: infantile eclampsia, infantile encephalitis, idiocy, epilepsy (Robinovitch, Kowalewski, and others).

Delinquency is in itself a good indication of defect or functional anomaly of the brain, even when it is due for the most part to the environment in which the individual has been brought up and developed. From this point of view (and we shall make it clear in the respective chapter) it should be noted whether the family delinquency is due to the social surroundings or exclusively to individual factors which have not even undergone the influence of education.

Consanguinity in marriage, especially between neuropathic persons, advanced age of the parents, or organic weakness—constitutional or resulting from disease—at the time of conception, may likewise be causes of psychic degeneration and of morbidity in the offspring. This is not the place to discuss the great number of hypotheses at the present day concerning the manner of interpreting heredity and its laws, nor can we dilate upon the fact (well confirmed since the time when Morel clearly demonstrated it) that very often the hereditary blemish is aggravated in the successive generations, nor upon the reasons for which it sometimes becomes neutralized, at least temporarily, by the intervention of the great modifiers of the nervous system, such as matrimony, the physico-moral environment, education, and so on.

Here we must content ourselves by simply stating what is already well known—viz., that no matter what the anomaly or deviation from the anthropological and functional type of the individual or family with respect to the historical moment of the existence of a society or a race, it may be the first link of a chain to which others and still others may be added in the descendants, with various changes up to the gravest forms of nervous and mental affections, and to the extinction of the family.

Having completed the inquiries into the intellectual and moral constitution of the family, it is necessary to become acquainted with the history of the individual, retracing his earlier years and even his infancy. It is not only useful but necessary to know how the maternal gestation proceeded and the character of the parturition, since severe trouble, mental shocks, infectious diseases during pregnancy—especially scarlatina, influenza, small-pox, and enteric fever—falls, injuries on the abdomen, as also difficult parturition, prolonged retention of the foetal head in the pelvis, misapplication of the forceps, give rise to cerebral affections or to morbid cerebral tendencies in the offspring (Freud). Such morbid tendency is sometimes well manifested for a time in eclamptic convulsions, which, when they are not the result of hæmorrhages or inflammations, are an expression of what is called convulsibility, and of what

may remain latent for a long time, or present itself again in maturity, in any vicissitude of life whatsoever, in the form of epilepsy, or any other more or less severe mental affection, which must, to all appearance, be connected with the convulsions suffered by the child in the early months of its existence, during lactation, dentition, etc.

¶ The epoch of the development of language and of walking is taken into special consideration, inasmuch as great delay signifies a true weakness and evolutionary deficiency of the central nervous system. What tendencies did the child manifest in assuming its first relations with the world, what instincts, what aptitudes, what new energies, what capacity of adaptation to the family or school discipline, what perversions, etc. ? Above all, it is requisite to inquire at what period and in what manner the sexual instinct manifested itself ; *e.g.*, I have observed remarkable precocity at the age of three years, blind impulsiveness in children from eight to twelve years, and sometimes older, leading them to abandon themselves to onanism or to bestial acts, without any awakening of the knowledge of danger. This I have often observed among peasants who cohabit with domestic animals.

In contrast to children who conform to the educative rules of the family and of the school, and who assimilate from the external world all that is good for the normal evolution of their understanding, it is necessary to place those who assimilate little or nothing of all this, and, as though they belonged to an epoch that has passed away, or to a social class long left behind by their parents, are rebellious or refractory to any means of education whatsoever, show themselves mobile and incoherent in conduct, sometimes cruel, irascible, obstinate, obtuse, or display an extraordinary intellectual phosphorescence, and are the so-called infant prodigies, whose future in many cases ends in complete disappointment.

Exaggerated affectivity, emotivity, illogical timidity, cruelty to animals, are all indications of the primitive cerebral structure, over which education and time sometimes spread the fine mantle of modernity, whose folds the storms of life raise now and again, to reveal to a greater or less extent the true primitive nature.

The intellectual capacity of the child and the youth, and the behaviour in school should be objects of particular inquiry, because when slow and compensatory evolution does not supervene there is a connection between these and obtuseness or intellectual incapacity of the adult, a fact which explains many family and social phenomena ; on the other hand, the inquiry furnishes the physician with precise indications concerning the education and occupations, to which must be directed a determined form or a given intellectual capacity.

One last task has the alienist in the study of the insane or anomalous person, and that is the investigation of the social environment in which the individual has developed and of the social class to

which he belongs, because too often, especially amongst Italians, do we find that between the classes and the masses the social differences are great, the distance enormous. When we contrast the impudently trivial conversation of the women of the masses, even on the public highway, with the delicate perfumery of the thought, sentiment, and language of our noble dames; the shamelessness of the commonplace woman with the delicacy of speech and attitude of the polished lady, even in a graceful error in conversation; the threatening and sinister bombastic tirade of a plebeian under the influence of a supposed injury which but leaves the polished and highly-developed man an unruffled calculator of the value to be attached to the offence, and a just judge of what best means he must employ to neutralize its consequences, it is easy to infer that in an individual belonging to polite society (since the differences will exist) such triviality, display, and vulgar impulsiveness serve to show up all the more strongly the long path traversed by the most polished and the retrograde significance of those facts in the evolved class (degeneration); while in the plebeian, although they are certainly teratological phenomena with respect to the conception we have formed of polite society, they are destitute of any morbid significance. If a lady enters a shop and steals some article, or a doctor entertained at the house of a relative appropriates some coffee or sugar, the fact alone that these two belong to a social grade in which these acts are censured may indicate morbosity on their side; but if a plebeian woman or child who is being reared in an environment where theft is held to be a legitimate means of subsistence, where the germ of respect for the property of others has not yet been cultivated, where the father gives the example and the advice to steal, takes to pocket-picking, the phenomenon no longer falls under the dominion of psychiatry.

The examination of the individual who is insane, or who is supposed to be so, is, accordingly, the most difficult task which modern medicine has assigned to the intelligence and culture of the practical physician, in whose mode of examination there are no tolerable transitions as regards either method or extent of investigation.



CHAPTER II

CLASSIFICATION OF THE MENTAL AFFECTIONS

BEFORE commencing the exposition of the forms that the psychopathies assume, it is well to come to an understanding about their classification. At the outset I had resolved, much against my will, not to present any classification in this treatise, consistently with the method followed in my school for many years. It was not that I was less alive than many of my contemporaries and predecessors to the need of a classification, of a categorization, which we feel imperative through that associative power intrinsic in things, just as in the products of our thought ; but I felt a strong repugnance for a work which I deemed, and still deem, almost useless, as giving only what is incomplete, and therefore not very vital.

We have had presented to us such a large number of classifications that our faith in another is shaken beforehand. The modifications wrought by authors on pre-existing classifications have not always been the necessary effect of progress in the knowledge of mental affections and their differentiation, but principally of subjective views, inasmuch as the argument is polyhedric, and no matter how we study or examine it, there is always some aspect that escapes observation, whilst others, at different times, fall into the field of inquiry. As a sphere with various designs, made to revolve on different axes, presents a new aspect at every turn, so the field of the mental affections presents a different picture on each attempt at classification.

Of the mental affections, the facts that are most abundant, best won to the science, most rationally classified, are the nosographic. But an exclusively nosographic classification is so empirical that it fails to satisfy even the less pressing exigencies of a democratization of the science, which thereby ends in losing its dignity and physiognomy. On the other hand, it is to be noted that the advantage of a nosographic classification would be very disputable even were it not overcome by the confusion that would thereby result in the intrinsic knowledge of the nature of the mental affections.

A simple nosographic classification would be a source of scientific

misconceptions ; the symptomatology cannot be singled out from other factors. It is well, however, to note that two factors never coincide. The lines are not superimposed ; the designs do not correspond. From whatever side we consider the mental affections with the object of classifying them, we arrive at fictitious associations, which express only one part of the truth, one or more contacts, not all.

The two criteria in the formation of a scientific classification which have been so happily employed in general medicine would, if adopted in psychiatry, give a very inferior and confusing result.

I allude to the ætiological and anatomo-pathological criteria. We do not know why tubercular infection produces in one predisposed individual neuritis, in another melancholia, in another the positive certainty to recover from the affection and to enjoy life ; nor do we know why hereditary syphilis in one predisposed person gives rise to idiocy, in another to hereditary tabes, in another to *infantile* spastic hemiplegia ; why the tubercle bacillus gives rise to tuberculosis, the comma bacillus to cholera, the streptococcus aureus to pyæmia, the pneumococcus to croupous pneumonia, and the bacillus of Eberth-Gaffky to enteric fever. Many of these micro-organisms produce confusedly, melancholia, sensory delirium, stupor, or polyneuritis, along with the polyneuritic psychosis. The post-influenzal and the post-enteric psychoses present very different nosographic features, although there may be reason to suppose that they are produced by the same agent. On the other hand, the puerperal, the post-influenzal, and some gestational psychoses may bear so close a resemblance in their clinical aspect and their course (when one has had a large field of observation) as at once to give rise to the belief that different causes may give rise to identical syndromes, and mental affections of different clinical figure may be generated by the same cause. It is useless to multiply the examples. An ætiological classification, now that we know that injuries and all the endogenous and exogenous toxic products give rise to the most varied syndromes by the intervention of another great factor—the individual—which itself turns the great wheel of the nosological varieties, would be neither scientific, rational, nor useful.

The same individual factor gives us the variety, which by some authorities has been considered on a basis of ætiological classification with respect to the various epochs of life. What interest, in fact, can that distinction have for pathology that takes its name from puberty, from the puerperium, or from the menopause ? When the fundamental symptoms of disease are met with identically in the pubescent, the adult, or the puerperal individual, the affection is necessarily the same in its fundamental mechanism, save that the variety of the *tout ensemble* of the clinical figure arises from the psychological variety of the incompleted personality of the

pubescent or the adolescent as compared with that of the adult person, or from the special condition of the puerperal woman, whose consciousness is filled with images that cannot have any place in that of the man or the youth at the opening of the flower of sexuality.

Not even is a classification on an anatomico-pathological basis to be taken seriously. I fully appreciate the fact that it might and ought to be our ideal. General medicine has given an example of its good fortune, when it constructed the indestructible arches of pathological anatomy, on which it has erected the great and magnificent edifice of pathology and classification. But where is the anatomico-pathological basis in psychiatry? What will be the anatomico-pathological alteration of the brain in hysterical stupor which sometimes disappears in a very short time, merely as we succeed in dissipating the anæsthesia and analgesia of the whole or a great part of the body? What is the anatomical substratum of the somnambulatory states, induced or spontaneous, which may be made to disappear in an instant? What is that of paranoia, of eccentricity (paraphrenia), and of emotional impressionability whose last degrees become fused in the syndrome of fixed, coercive ideas, etc.? And what rule can we draw from our knowledge of the psychic disturbances consequent upon destructive processes in the brain, if the respective syndromes depend upon the seat and extent and not upon the nature of the focus?

There is a syndrome, terminal to destructive foci in the brain, which has been described as post-hemiplegic dementia; but everyone knows that a destructive focus in the temporal lobe gives a syndrome quite different from that arising from a destructive process in the somæsthetic zone; a lesion of the occipital lobe gives a syndrome quite different from that given by a focus in the pre-frontal region; lesions of the right hemisphere produce mental disturbances rather less significant than those consecutive to lesions of the left hemisphere. In the outward manifestation that reflects the extent of the focus, difference of topography is a factor of the greatest importance. A small focus in the first temporal convolution on the left side may give rise to a syndrome with prevailing notes of dementia, while a focus in the frontal lobe, either right or left, may pass almost unobserved.

The minute alterations in the cells observed up till now do not present anything characteristic of each psychopathic form. Chromatolysis (cytolysis), which is met with in sensory delirium, is found also in profound melancholia, and possibly this alteration does not differ essentially, so far, at least, as we can deduce from the researches thus far prosecuted, from the cytolysis resulting from uræmic intoxication, or from that depending on the isolation of the nerve-cell from its associations. Again, the lesions that are met with in secondary dementia are not capable of differentiation,

no matter what the form of the dementia and the primary affection to which it was the sequel.

It is needless, however, to multiply instances, or to proceed any further in this demonstration. From the few facts already put forward, it appears evident to everyone interested in medical instruction that a classification of the mental affections on an anatomo-pathological basis is to-day still out of the question. Our tendency to find an anatomo-pathological basis is determined, and, indeed, justified, by our scientific education, and by the trend of general medicine; it is no more than an aspiration, but it is efficacious in promoting the progress of our science. Perhaps what we call the individual factor corresponds to the teratological or anatomo-pathological particularity of the nervous elements, considered singly or in their more or less wide associations: it is the field the most promising of good fruits for the investigators of the future; but meanwhile, if the state of our knowledge justifies the aspiration, it does not justify the attempt. We must take some other course.

For the same reasons, we have not found preferable the psychological criterion in the sense of Ziehen, followed in this conception also by Mendel in his last handbook of psychiatry. Mendel distinguishes the intellectual from the affective psychoses, inasmuch as the latter are not accompanied by true intellectual defects, while in the former the intellectual defect or disturbance is the most conspicuous fact of the affection.

Such a distinction, however, is founded more on appearance than on reality, because, although the affective psychoses, such as mania and melancholia, appear to be essentially affections of the emotions and the sentiments, the accompanying intellectual disturbance is equally profound and substantial, while in the intellectual psychoses such as stupor the vitality of the emotions and of the sentiments is also abolished or profoundly disturbed; and paranoia, as we shall see, is essentially an affective-intellectual disorder, inasmuch as the deliria arise from an abnormal manner of feeling. The psychological criterion, accordingly, is no less exempt from criticism than the other two—the ætiological and the anatomo-pathological. It also must be put to one side.

The ætiological criterion, harmonized with the symptomatological, has met with better fortune, and rightly so. The classifications of Krafft-Ebing and of Schüle, received with much favour in Germany, and dominant there and elsewhere for a long time, have been mainly inspired by it. One important feature I find in the classification adopted by these two prominent psychiatrists: it is that which refers to the grade of evolution of the brain and of the mind, and gives material for one great primary division into psychoses on a foundation of complete psycho-organic development, and psychoses on a foundation of defective or

incomplete development. Therein the primary happy conception of Morel finds a large application, and, as we shall see, it is also the criterion that gives form to the classification preferred by me.

In Italy the problem of the mental affections has been dealt with from the very infancy, we might say, of psychiatry, and the progress of the evolution of Italian psychiatric thought has been mapped out into stages by the proposals and discussions in the congresses of the learned societies, more especially of the psychiatric, from 1845 up till the last congress of Italian psychiatrists held recently in Ancona.

The nature of this treatise does not permit of a report of the principal and most recent classifications proposed by the Italian psychiatrists (Morselli, Angiolella, D'Agostini), nor of a comparative examination of these classifications and those of Krafft-Ebing and of Schüle—the foreign psychiatrists whose names rank amongst those best known in Italy by the diffusion of their treatises translated into Italian—those of the English writers Berkeley and Clauston, and many others from all countries. They demonstrate more particularly the great progress of psychiatric thought, as compared with the old classification of Verga, and at the same time the eclecticism of Italy, where originality, by no means rare, is not disjoined from the utilization of all that is good and assimilable in the foreign productions.

While Morselli pays much attention to the clinical and psychological aspect of the mental affections, D'Agostini and Angiolella have introduced into their classification the more recent conception of the intoxications and the consequent histological alterations, criteria which, if they cannot and must not be lost sight of for a more rational categorization of the mental affections in the future, cannot furnish in the actual evolutionary grade of our sciences a sure foundation for a rational and more lasting classification.

In the last congress at Ancona the expositive and critical work of De Sanctis was of no avail in giving a classification which should be the synthetic expression of modern psychiatric thought.

The members of the commission appointed with the object of giving to Italy a more rational and scientific classification than that used for the official statistics up till that time did not succeed in coming to an agreement; their good intentions failed in the face of insurmountable intrinsic difficulties.

Fresh obstacles arose every moment under the lash of criticism, and, wrote the reporter, all had to abandon their own individual convictions, or many of them, and arrive at a common field of view, so as to construct a classification which should correspond on the one hand to the thought of modern psychiatrists, and on the other to the necessity for a formulary which all might adopt so as to come to a common understanding, possibly with the single object of furnishing the elements for general statistics of the mental affections.

The following classification is exactly the one proposed by the commission and approved by the congress. I am pleased to reproduce it here.

I. CONGENITAL PSYCHOSES :

Arrests and deviations of psychic development.

Phrenasthenia.
Moral insanity.
Psychopathia sexualis.

2. SIMPLE ACUTE PSYCHOSES :

States of mania.
States of melancholia.
Amentia.
Sensory psychosis.

3. CHRONIC PSYCHOSES, PRIMARY AND CONSECUTIVE :

Paranoia.
Periodic psychoses.
States of dementia :
 (a) Senile.
 (b) Secondary.

4. PARALYTIC PSYCHOSES :

Classic paralytic dementia.
Luetic dementia.
Alcoholic dementia.
Encephalomalacic dementia.

5. PSYCHOSES FROM NEUROSES :

Epileptic psychosis.
Hysteric psychosis.
Neurasthenic psychosis.
Choreic psychosis.

6. TOXIC PSYCHOSES :

Pellagrous psychosis.
Alcoholic psychosis.
Morphinic psychosis.
Cocainic, etc., psychosis.

7. INFECTIVE PSYCHOSES :

Post-influenzal, enteric, etc., psychosis.
Syphilitic psychosis.
Acute delirium.

In this treatise I do not feel bound to adapt myself in any way, because no extraneous reason can constrain, by any directive, scientific thought that arises from long observation.

Although for a long time I have believed in the theoretical futility of a classification, nevertheless, for the reasons given, I have adopted one, which is also very eclectic in the sense that it is inspired by nosological, ætiological, and anatomo-pathological criteria.

Having now recognized generally the impossibility of holding to a single criterion, it is clear, as the most recent attempts demonstrate, that that classification gives promise of wider acceptance and longer duration which assumes the greatest number of fundamental criteria on which is based the general knowledge concerning the genesis and nature of the mental affections.

Such has been the directive thought in this other attempt at classification.

The mental affections may be divided into three great groups. The first comprises the affections represented essentially by an evolutionary psycho-cerebral defect; a second group comprises all the mental affections of infective, autotoxic, and toxic origin developing in individuals regularly evolved; in the third group are included all the affections with an organic substratum, localized or diffuse, in the central organ of mind.

These groups are not separated and precisely distinguished from one another, because, each of them being distinguished by a characteristic not comparable with that which contradistinguishes the other two, it is very evident that the characteristics not included under the differential criteria are common to all or some of the groups.

It is clear that the intoxications and the infections, besides finding a good soil for development in brains predisposed but fully evolved, secure favourable conditions also in the brains of the first group; and, on the other hand, the evolutionary defects of the brain are very often determined by anatomo-pathological lesions, either diffuse and incapable of localization—*e.g.*, hydrocephalus—or circumscribed—like encephalitis, destructive foci, localized cerebral syphilids, and agenesis—lesions which often occur during gestation or in the early years of extra-uterine life.

We can with good reason hold that localized lesions which are a cause of arrest of cerebral development, or of tardy and imperfect development, may also be of infective origin, and that some infections, such as syphilis and variola, or some intoxications, like that resulting from the imbibition of alcoholic stimulants in toxic quantities by the mother or father, have a great influence on the evolutionary potentiality of the individual, and for the present we may say that it is immaterial whether the cause has its seat in the ovum or in the poisoned nemasperm (Maffucci, Féré). We may also hold that the second group of mental affections arising from intoxication and infection is probably based on anatomical alterations, inasmuch as we know that endogenous or exogenous toxins produce microscopic alterations in the minute structure of the nerve-elements

(chromatolysis or cytolysis). The infections and intoxications, then, are not confined to the second group, but are found also in the first and probably in the third; and the anatomical lesions are not characteristic of the third group alone, but are found, and that to a marked extent, in the first and in the second. It is clear, however, that the differential exponent of the single groups is the predominant characteristic in each of them, to which, no matter what be the clinical picture, it gives the specific note of recognition, while, on the other hand, it permits a more certain pathological orientation and a more logical distribution of the psychopathic syndromes.

In putting forward in this manner the scientific material constituting the patrimony of psychiatry, we have never lost sight of the clinical criterion in the widest sense of the word—a criterion which has been adopted by Kraepelin very explicitly in the last edition of his work, and which must be conceived in the sense of the complete knowledge of the illness, its evolutionary story, and the different attitudes it may assume at different times.

It was this that permitted me to comprise under the denomination of 'sensory insanity' several of those syndromes which were and are still designated as distinct maladies by the French and German psychiatrists—such as mental confusion, amentia, acute dementia, stupor, katatonia, etc.

I have a rooted conviction that many mental affections bearing a great name and occupying a distinct place in the classifications are only prolonged phases of one affection whose initiation, as frequently happens, has completely escaped observation. Granted even that the rationality of the division of all the mental affections into the three groups before mentioned becomes recognized by psychiatrists, another great difficulty presents itself in the distribution of the mental affections for each single group.

In this regard the group best definable is the third, which corresponds to the fourth group of the classification proposed by the commission at the congress at Ancona, to which should be added the subgroup of the traumatic psychoses, inasmuch as the grosser anatomical lesion, though probable, may not be capable of verification.

Much greater difficulties are met with in the attempt to fix the limits of the first group, as several affections can belong to the first as well as the second group, according to the side from which they are viewed. Where shall we place epilepsy, hysteria, fixed ideas, late paranoia, and some other states? The common view to-day is that epilepsy is of toxic origin; that hysteria sometimes develops in beings well constituted cerebrally; that fixed ideas sometimes present themselves for a time as stigmata of cerebral imperfection, at other times appear at a late period in well-constituted persons worn out either by overwork or by the abuses of life. Unprejudiced and close observation of the facts, however, permits us to arrive at

a sufficiently logical and well-founded distinction of all these morbid forms. Since we cannot here take account of that occasional epilepsy that is symptomatic of such processes as traumata, encephalitis, tumours, syphilitic endarteritis and atheroma, etc., the majority of the epilepsies, with these exceptions, are more or less early manifestations of a defective cerebral evolution.

The epileptic convulsions of adolescents or youths who have the appearance of a normal intellectual development are allied in the majority of instances to eclampsia, which, after all, is nothing else than the epilepsy of infancy. It is always an expression of more or less sensible cerebral anomalies—cerebral morbidity, asymmetries, anomalies of the intimate structure, etc.—while, on the other hand, it leaves indelible stigmata of its temporary existence in the excitable, irascible, violent, impulsive character. The search for these notes in epileptics with a well-attained and sometimes even luxuriant intellectual evolution is almost always positive: their presence is the irrefutable proof of an evolutionary defect of the mind with regard to those activities and manifestations which are the highest and surest expression of a high mental development, summed up in the attentive power, in the ready and happy utilization of all the intellectual resources, and, above all else, in the sure control and command of the passions. It is clear that this form of epilepsy—which I would almost call primary, and which should be included in the first group—cannot be confused with that form symptomatic of the most diverse processes to which the brain may be subject.

We are well aware, however, that while the epilepsy is frequently latent, in its psychic character it exists concealed by intelligence of no mean order, and we erroneously suppose that we are dealing with an acquired form, while, on the contrary, as I have already said, the convulsions are connected, through the conducting wires of the character, with the epilepsy of infancy, and may be considered as evident in the insufficiency of the highest mental powers.

Even hysteria may be comprised in the first group. The well-evolved mind carries with it the character of strong organization and resistance to disintegrating agents. If we assume that the fundamental character of hysteria is decomposability of the psychic personality (imitativeness, suggestiveness, credulity, mobility, etc.), we must classify hysteria among the defects.

No one will contest the complete curability of hysteria, even when it assumes the gravest form, yet, on the other hand, no one who has had opportunities of long and close observation can deny the latency of hysteria in the psychic character, either after recovery or even when the disease has never shown all the features characteristic of the minor or the major affection.

We may, without fear of contradiction, enumerate among evolutionary defects fixed ideas, which hold to another fundamental law of the mind—viz., that of the prompt renewal of impressions,

the prompt elimination from the consciousness of all the useless perceptions or products of the mind, and the presence of an emotional exponent not exceeding a certain limit compatible with the intensity, duration, and nature of the agents.

If the emotivity is exaggerated—and, as a rule, it is also of a primitive, unevolved nature—if the eliminating power of the consciousness is low or almost nil, if the residuum or the trace of the impression is exceptionally strong and prolonged, besides being disproportionate to the intensity and nature of the stimulus, all this is a psycho-cerebral evolutionary defect. Such an impressionability may be traced in all individuals in whom we have reason to believe the existence of an acquired form of fixed ideas through superadded neurasthenia, which in most cases is constitutional and latent, and it is therefore, in my opinion, to be included in the group of the evolutionary defects.

The inquiry into the origin of the morbid phenomena of the mind and the investigation of the individual and family character of the patient furnish elements for a clearer knowledge of the phenomena and the syndromes, hence for a more rational classification of the mental affections. Having regard to these considerations, the first great group appears constituted as follows :

1. Phrenasthenias.
2. Paraphrenias.
3. Congenital moral insanity.
4. Epilepsy.
5. Hysteria.
6. Developmental paranoia.
7. Fixed ideas—emotivity.
8. Developmental neurasthenia.
9. Sexual psychopathies.

The second group should comprise all those psychopathies that arise in individuals with normally evolved brain. It is not exclusive, since the incompletely evolved are likewise subject to the disorders in this group; but this does not diminish the value of certain facts that concur in impressing on the group in question the essentially characteristic features that distinguish it from the other two—viz., (1) taking into account the distances between the limits that mark the grade of psycho-somatic evolution in each race, the affections constituting the group arise in most instances in individuals certainly predisposed yet normally evolved; (2) their commencement is acute; (3) it is always an extraneous product, biochemical or otherwise, endogenous or exogenous, that induces the histological and chemical alterations in the nerve-element, whence arise various clinical pictures which precisely enter into the constitution of this group, further divided into two subgroups :

- (a) Psychoses arising from infections and auto-intoxications.
- (b) Toxic psychoses.

In the first subgroup we include :

Mania.
 Lypemania.
 Exalted-depressive insanity.
 Circular and periodical insanity.
 Sensory insanity.
 Mental confusion.
 Acute paranoia.
 Late paranoia.
 Neurasthenic insanity.
 Choreic insanity.
 Luetic insanity.
 Acute delirium.

In the second subgroup we include :

Pellagrous insanity.
 Alcoholic ,,
 Morphinic ,,
 Cocainic ,,
 Chloralic ,,
 Saturnine ,,
 Insanity from carbon monoxide.

Anyone may educe from this grouping that if I have made no mention of *amentia*, acute dementia, katatonic psychosis, dementia *præcox*, it is because the objective and historical examination of these conditions must convince every sincere observer that they are only syndromes, sometimes simple phases or gradations of the same sensory psychosis ; for, according to my long experience, there is always a preceding hallucinatory state which should characterize the true nature of the malady, and oblige us to recognize those syndromes as not really distinct morbid forms, but phases and varieties of an identical affection. In fact, it is by no means a rare thing for sensory insanity to pass, during the long course of the illness, through the different phases in which is successively summed up the figures of *amentia*, acute dementia, katatonia.

On the other hand, I have added to the group acute paranoia and confusion. The first, though very rare, is sharply distinguished from hallucinatory mental confusion, as I have had occasion to observe in my wide experience. It is an acute disturbance resembling sensory insanity, but having only the appearance of it, being in reality a disturbance exclusively in the field of the intellect, and consisting essentially in a false interpretation of real perceptions of the external world. I have admitted into the same group mental confusion, although I am convinced that it always follows hallucinations, because in some very rare cases I have not succeeded in confirming the existence of sensory disturbances whilst recon-

structing the history of the illness, and therefore I cannot, with due respect to the observations of Chaslin and others, exclude the possibility of the existence of a form of confusion not hallucinatory.

The third group comprises all those affections and syndromes which are the expression of known and demonstrable anatomopathological alterations of the brain :

Paralytic dementia.

Luetic dementia.

Senile dementia.

Post-hemiplegic dementia.

Aphasic dementia.

Traumatic dementia.

Dementia arising from tumours, scleroses, plaques, and other organic diseases of the brain.

Such a classification is not exempt from criticism. It comprises only the morbid species.

As it is impossible to have a classification in which all the individual psychopathic forms can be categorized in a rational manner, so also must we definitely abandon any attempt at a classification which has as a basis the physiological phases of life. Here we have the substitution of an individual factor which gives a decidedly personal imprint, and must be valued in each case with relation to the previous history of the patient. Such a classification would lead to great confusion, and would in no way assist in giving us a plausible orientation. If we have formed the conviction that the so-called puerperal psychosis assumes diverse clinical aspects, what do we gain by denominating all these various maladies *puerperal insanity*, and not assigning the proper name to each syndrome or to each morbid form, which may be a melancholia or a sensory psychosis or something else? And, again, do we gain any clearer knowledge by attributing a clinical individuality to *hebephrenia*, the insanity of adolescence?

The clinical character of each malady, in the case of those recognisable, should be at all ages the true and only denominators of the affection, as they are the points of recognition in mental and clinical pathology. The individual varieties and those related to age are contingencies which the clinician must value time after time. Thus it is that we speak of senile dementia and not senile insanity, because, given a psychopathy in an old man, either there was previously a mental *deficit* which has now become accentuated and is dementia, or there was no such deficit. In the latter case the aged may present the most diverse clinical pictures, with no particular characteristics other than they derive from those special to the mind of the old man and his legitimate preoccupations, which do not alter the fundamental notes of the malady.

We have added aphasic dementia, with all its varieties, on

account of the conspicuous features that contradistinguish it from all other forms of dementia, and all those caused by destructive foci in the brain, not localized in the zone of language.

We spoke of not blinding ourselves with regard to the vulnerable aspects of this classification. Someone assuredly will observe that idiocy might also be classified in the last group, because idiocy, as a rule, is produced by diffuse or, more often, circumscribed cerebral lesions.

But I have already said that the classification cannot be based on one characteristic alone, but on several, together with that leading one which points more strongly and particularly to one group than to the others. Thus it is that in the first group, no matter what the causative agents, there is always recognizable a primary defect through arrest of cerebral development; in the second group, no matter what the clinical forms, there always remains the fundamental fact that the malady, in developing, surprises the mental vigour in full functional efflorescence, and, according to the modern views, through an altered chemistry; in the third group the malady attacks fully and regularly developed individuals, and shows a great prevalence of somatic phenomena and psychic symptoms, which, as a rule, are characterizable as a *deficit* in prevailing relation with the localizations of the destructive processes and with the diffuse degenerative processes in the cerebral substance.

We shall describe in a single chapter, without classification, the secondary dementias. All the mental affections of the second group, and many of the first, after a long duration, and when they do not recover, give rise to phenomena characteristic of mental decadence, which frequently is slowly progressive. The secondary dementias present a number of general symptoms, always identical, whatever the clinical form from which the particular symptoms are derived: they represent only a residual *quid* of the former personality, associated with another group of facts referring to the primary uncured mental malady, which has lost some of its characteristics.

CHAPTER III

PHRENASTHENIAS

UNDER the name *phrenasthenia* are comprised all the forms of defective evolution of the mind. They constitute a very numerous family, the individual members of which differ very widely from one another, especially in the extreme degrees, from those who present only a more or less anomalous and degraded form of the human being and a mentalization comparable or much inferior to that of the quadrumanes or other mammals, rising by degrees up to those who live in society and participate with labour in the common life.

These last, however, present a very appreciable mental weakness, especially in the mental synthesis and in the intellectual and emotional manifestations of the mind, the value of which is calculated less on its own merits than in its social relations.

Many psychiatrists have taken pains to arrive at the constitution of subgroups belonging to the numerous class of the phrenastheniacs; this is the outcome of a natural tendency to categorization, but the truth is that the passage between the extreme representatives of the class is so gradual that any division whatever becomes artificial. At the most, a logical distinction might be based on the difference of the causes determining the phrenasthenias.

In some, indeed, we have to deal with a simple evolutionary defect of varying degree, not caused by any anatomo-pathological process arising during the cerebral development; in others, again, the evolution is arrested or deviated by a diffuse or circumscribed pathological process in the brain or its membranes; while, in a third group, the arrest is caused by particular forms of intoxication. These last constitute the myxœdematous group and that of the cretins. The distinction on this basis is a logical one, and responds to a reality. Having regard, however, purely to the psychic manifestations, there are no points where we can draw lines of separation dividing into groups the representatives of this numerous class, which goes by infinitely small degrees from almost absolute amentia to the numerous and multiple interlockings of weaklings who live mingled with the weaker normal individuals, but in all cases

differ from those who in each country give the mean standard of mentality of the race concerned.

Nevertheless, we cannot free ourselves from the traditional nomenclature of idiots, imbeciles, and weak-minded, adopted now for a long time by the majority of writers; but it must be clearly understood that we do not mean to signify by these names well-distinguished groups, but simply stronger differences of intermediate and extreme degrees of arrest of development.

Idiotism or idiocy comprises the least evolved of all (lowest phrenastheniacs), imbeciles come next, then the cretins (medium phrenastheniacs), and lastly the weak-minded (highest phrenastheniacs). It goes without saying that those comprised in the group of idiots present, in their turn, an extensive gradation from the lowest to the highest, who become blended with the imbeciles. The most evolved of this last group become blended with the simply weak-minded, in the same way that the most evolved of these become confounded with the normal. In their mental development the cretins resemble imbeciles more than idiots, in the majority of cases; but they form a group by themselves as regards both form and genesis, and we shall consider them separately.

It is said that idiots do not possess language, or have a very rudimentary and poor one, while the most evolved imbeciles speak like sane persons, except that they show poverty of thought. But so far as speech is concerned, our former general remarks about the mentalization of these beings holds good: there exists a very gradual transition in the imperfect formation and manifestation of language, which does not permit a clear distinction between the two groups. In fact, Sollier himself, who, amongst many, has made a most detailed study of the mind and language of phrenastheniacs (*Psychologie de l'idiot et de l'imbécile*, 1901), is obliged to admit to the group of the idiots the lowest and the highest degrees, and to that of the imbeciles the same extremes of a long gradation.

General Symptomatology.—In the symptomatological exposition we shall not follow any differential criterion distinguishing idiots from imbeciles and imbeciles from weak-minded, for by so doing we should have to repeat ourselves, and this we wish to avoid. There is only one fundamental conception, only one psychopathological symptomatology, which stretches from the pronounced tints and the decisive lines of idiocy to the hardly perceptible blendings presented by the weak-minded and by many cretins, who also exhibit all grades of defective mental evolution.

Still less can we follow in this treatise the views of certain authors, especially of Ireland, who form many subgroups of idiocy. Ireland, in fact, forms twelve subgroups corresponding to so many characteristic features ('Mental Affections of Children,' 1898). If the description of the forms assumed by idiocy is facilitated in this manner, the pathological conception becomes confused. The evidence of the

clinical and anatomo-pathological facts suggests to us three distinctions. Clinically, indeed, we can distinguish idiots and imbeciles into (a) a primary group comprising all those who are neither epileptic nor paralytic, and who, as a rule, are microcephalic; (b) a second group comprising the phrenastheniacs (imbeciles or idiots) who at the same time are epileptic and paralytic (and we might prolong the enumeration by adding also the choreic); and (c) a third group, well distinguished clinically, comprising the myxœdematous idiots. The distinction under the anatomo-pathological aspect is founded on the fact that, while in a number of cases we have to deal with an arrest of development by a primary defect of the evolutionary capacity, in other cases we have anatomo-pathological processes coming into play, destroying one part of the brain and hindering the development of the remaining part. The third group is characterized by defective development of the thyroid body. In every way I prefer a general description of the psycho-somatic character of the idiot and of the imbecile, substituting for the more detailed descriptions some clinical observations very fully reported.

On examining the manifestations of the psychic life of the idiot, there is always evident a marked defect of all the mental activities. There is nearly always complete absence of the highest activities. Commencing with the sensations, these are found to be more or less imperfect, sometimes entirely wanting. From the earliest months a mother frequently notices that her infant does not see, or does not fix, objects. The look is vague and uncertain, as though directed into space. The power of accommodation, which is one of the motor manifestations of attention, is defective. Some behave thus even in later childhood and adolescence. Sometimes they stop too long on one object, as if no other attraction were present, and as if the visual field were restricted to a single point, and even it they do not perceive clearly, nor do they form a well-defined and reproducible image of it. It is difficult to assert that they recognize colours even when they are older. Possibly some of the strongest are perceived, such as red and orange; but even when they do notice differences in colours it often happens that they do not know their names. They are not even capable of recognizing the forms of objects, or, at least, a good number of them, so as to categorize them and attain the abstract knowledge of forms and volumes.

As in the case of sight, so also of hearing; sometimes it is entirely wanting, and it is well not to confuse these cases with deaf-mutism, in which, as a rule, there is a marked defect of intelligence. Most frequently we have to deal with pseudo-deafness—due to failure of the power of attention.

The tactile sensibility is blunted. Sometimes it appears totally absent. I have experienced extreme difficulty in investigating it. If, remaining out of sight, we surprise an idiot of the lowest grade by means of tactile stimuli applied to the face, the scalp, the hands,

or other exposed parts of the body, he often gives no sign of having perceived them. It is necessary to repeat the contact several times, intensifying it so as to reach the threshold of pain, in order that he may give a sign of feeling. Sometimes even small punctures are not noticed, but stronger pains are almost always felt. As in sight and hearing, so also we have in these cases not so much a true absence as a greater bluntness, torpor, marked defect of attention, perception, and reaction.

We meet with greater defect in taste and smell. Mantegazza, in one of his many popular books, wrote : ' Tell me what you eat, and I will tell you what you are.' It would be better to say, ' Tell me *how* you eat,' etc. As a rule, idiots are voracious ; sometimes they do not make any distinction between one food and another ; when eating, they very often plunge the whole hand into the bowl, over which they bend with greedy mouth, allowing some of the food to fall over the face and on the clothing, and they soil themselves to such an extent that it is impossible to make them sit at the same table as other patients. They take their food with either the right or left hand ; if they have several dishes in front of them, they mix everything in a single bowl—bread, cake, wine, meat. They collect the crumbs and the morsels that have fallen on the ground, and put even the filthiest things in their mouths ; in the lowest grades, idiots do not even make that selection of food which is so characteristic of all the higher animals ; they swallow everything. At the autopsy of some idiots, especially those confined in public hospitals and asylums where not much care is taken of them, it is not a rare thing to find the stomach full of straws, paper, hairs, and remedial articles.

Sometimes they do not distinguish the bitterness of colocynth from the sweetness of sugar. It is needless to speak of the different tastes of the delicate viands that an elegant table offers or that a refined cook prepares ; or of the different odours that remain definitely outside the threshold of perception in idiots even not of the lowest grades.

The time of reaction is much longer in phrenasthenic than in normal individuals (Buccola).

Avidity for alcoholic beverages is frequent, especially when there is an alcoholic heredity, which is not very rare.

The bluntness and the evolutionary defect of the senses give us an idea what to expect of the intellect of idiots.

Certainly they sometimes form a larger or smaller patrimony of concrete images of objects, so that idiots recognise a number of persons and a number of objects and places ; but it is always restricted as compared with that of the evolved man. They also have desires, and sometimes make requests in their own fashion. They are capable of forming groups of associated images and general categories, more or less extensive and comprehensive, especially those of them who are somewhat evolved. But they never arrive

at intellectual syntheses demanding a large association and a more complete fusion of concrete images, besides a very large number of images differentiated, categorized, and well conserved.

Slight, and sometimes even great, differences between similar things escape the notice of the idiot. He gathers only the general features of persons, objects, and places surrounding him ; in the same way, all the blendings of colours escape him, although he be able to distinguish red from blue and orange, and hence he confuses many things that differ from one another. He tends to generalize, not by a process of synthesis, but through a defect of differentiation. If he learns the name of one nurse, he calls all the others dressed in like manner by the same name. A certain idiot succeeded in learning to distinguish the medical officers from the attendants and the latter from the patients, but for a long time was unable to distinguish the different doctors, and it was only after long exercise that he was able to distinguish the superintendent from the medical officers. A microcephalic idiot confined in the Sales Asylum called all the men she saw 'papa,' and all the nurses and female patients 'mamma' or 'auntie,' without being able to make any distinction between them.

They do not understand ordinary language in all its extent, but only some words which they can refer, by long practice, to something pleasant or unpleasant, or to some person well known to them through long association. As a rule, even this association is vague and superficial. The associative power is rudimentary, and the judgment of individual sensations is simple and immediate. There is no intellectual resource revealing any imaginative power whatsoever ; if they were not cared for they would die.

How much inferior is their intelligence to that of the monkey ! If we give to a monkey fond of cherries one dipped in a solution of quinine, it thinks out the plan of peeling it and eating only the mesocarp, which is not bitter ; greedy as it is for sugar, if we give it some in a small bottle, from the bottom of which it can find no mode of raising it, after having in vain attempted to reach the bottom with its short finger, in a moment of strong avidity it is able intuitively to conceive the idea of breaking the bottle, taking it by the neck and dashing it with force to the ground. The mind of the worst idiots is often devoid of similar resources. The intelligence and attitude of many resemble those of the dog. This resemblance has been most clearly shown by Sciamanna. Briefly put, the fund of displaceable images is very poor, and is capable of but little association, and hence is of small utility.

The idiot may form empirical judgments for himself, through the experiences of the proper senses ; he will recognise cutting, pungent, scalding, glittering, sonorous bodies, with which only sometimes does he associate the verbal symbol. He avoids or approaches such bodies or persons in his environment according to

the experience he has had of them. If on a former occasion he has been bitten by a dog, he will run away from that dog ; if he was tormented and irritated by rogues, he will chase them or assail them with stones ; he will also arrive at a general idea of money, as is noted in wandering beggars of the imbecile grade of evolution (Maffei, Emminghaus).

The general plan of their mental organization might be represented in a scheme containing some sensory elements which are common to many objects, and hence give rise to confusion and error in judgments of recognition. A piece of chalk is mistaken for a piece of sugar (as happens in monkeys after mutilation of the frontal lobes), an instantaneous light is mistaken for a flash of lightning, a loud noise for thunder.

The most definite empirical conception that the idiot may form is that of his own identity, of his proper *ego*. With sensory experience, with the succession of his own feelings, under the influence of external stimuli, with the repetition of interests relative to his own person, he arrives at distinguishing the *ego* from the *non ego*. As these sensations, experiences, and interests are infinitely less numerous in the idiot and even in the imbecile than in the normal individual, so the idiot arrives at a ready formation of the empirical conception of *self*, joined with the satisfaction of the proper instincts, and hence the enormous preponderance, even frequently the exclusive dominion, of egoism. His ego lacks infinite associated groups and abstract categories freed from the immediate sensual images, as well as the relation of cause and effect, and the difference between *meum* and *tuum*, between the *useful* and the *hurtful*. Thence arise all the errors and all the dangers connected with the conduct of the idiot, and especially the imbecile. Being deprived, especially through deficiency in associations by contrast, of a rich fount of intellectual resources and judgments—which in the phrenasthenic are formed merely on the basis of a few features of resemblance—the conclusions of identity or want of identity are often erroneous, and the correlative action is fulfilled only in the interest and under the directive influence of an agreeable or disagreeable feeling of a sensual nature.

The process of perception, internal and external, being defective in him, he is deprived of the final result of the function of the senses as regards *cognition*, and everything becomes reduced to fixing the gaze on shining objects made conspicuous by strong colours, and on fire more than anything else. A blazing flame gives great pleasure to idiots and imbeciles ; with this pleasure is associated the empirical acquaintance with inflammable substances. Thus it is that they sometimes derive pleasure from setting fire to things (case of Spielmann). Sometimes they dream of a fire or a conflagration, and may carry the dream into effect, the dream being to

them like an invitation or a suggestion, unrestrained by any other consideration such as damage or danger, as in the case of Heinrôth.

With this fact coincides great defect of attention and of memory. Voluntary attention is so constantly defective in the idiot that Sollier bases the distinction of the grades of idiocy upon its degree of development. Spontaneous or sensory attention is always present, but even this shows various degrees, according to the grade of perceptive capacity. In the less severe forms the educability of the phrenasthenic holds some relation to the possibility of transforming spontaneous into voluntary attention. The most pronounced idiots, by reason of the impossibility of such transformation, are not educable. On the other hand, the attention is unstable.

Many idiots, particularly the hereditary, pass with great rapidity from one thing to another falling under their torpid senses, without fixing the features of any. Even imbeciles present in a minor degree the same instability or marked exhaustibility of attention. There are some idiots and imbeciles who seem to pay attention to things, but it is no more than an external semblance, because, as a matter of fact, they neither perceive nor fix, almost as though the mind were absorbed or preoccupied, while in reality it is void, and they have only the muscular attitude of attention. From this point of view we may divide phrenasthenics into mobile or, as others call them, *dissipated* distracted and *absorbed* distracted.

The memory of phrenasthenics presents greater variation than the attention ; the most pronounced, those at the lower end of the scale, remember only those persons who take care of them and the objects that make the deepest impression on them in the satisfaction of the fundamental instincts (food, water, wine), or instruments and persons that have caused them to feel pain. Proceeding by degrees, others remember a large number of impressions referable to themselves, to places, persons, and events. We can state it as a law that everything that is not fixed, owing to defect of attention, is neither conserved nor reproducible. Even in the higher evolved phrenasthenics, however, memory is fragmentary, unreliable, torpid, so that we cannot place reliance on what imbeciles tell us ; above all, precision as regards the memories of time, place, and persons is defective, so that mistakes are frequent.

Vice versâ, the mechanical memory is in many cases highly developed. Many idiots of a rather low degree have a good memory for musical movements (cases of Ferrari, reported in the second part). Some remember forms well, so that they are able to reproduce them (cases of Griesinger, Bourneville, Ireland). Others have a good memory for places ; the cretins, for example, remember places in the woods where they go and hide their foodstuffs (Maffei, reported by Emminghaus). It is quite apparent in these cases that the sense of direction is also well developed (resemblance to animals). Others, again, can learn a page of writing after a single

reading, without having understood it, and repeat it with surprising precision. Drobisch speaks of an idiot child who, through the untiring zeal of a noble signora, had been able to learn to read quickly, and to repeat a whole page, word for word, without any idea as to its meaning. Guggenbühl reports the case of a child (examined by Spielmann) who was able to indicate, by its broken language and with the aid of mimicry, the days of the birth and the death of every inhabitant in his community. An imbecile, confined in the Naples asylum, remembered the saints for each day of the calendar. Others possess a strong memory for numbers, so that they can do calculations very rapidly by memory—*e.g.*, multiplications and divisions of several ciphers (*vide* Part II.). The distinction between the memory of the normal man and that of the phrenasthenic lies principally in this, that the phrenasthenic, through defect of associative power, does not utilize the mnemonic patrimony in the various circumstances of life, but reproduces it as a stereotype in single circumstances. In the low-grade idiot there is entire absence of that process of decomposition and recomposition, based on memory and characterizing the normal mind, which can give with the same material the most varied products; while in the imbecile it is present only to a slight extent.

For the same reason, the imitative faculty, which plays such a great part in the education of the normal child, is in phrenasthenics a reflex act. What they imitate is not, as a rule, understood.

Credulity is a characteristic common to very many of them. The imbecile and the idiot who is not of the lowest grade may be made to believe even the most improbable things, and sometimes it is difficult to dissuade them from believing what they have once considered to be true. They are ridiculous even in their incredulity. The more highly evolved of them (imbeciles) readily accept the hyperbolic compliments and the homage paid to them in jest, and this may even give rise to paranoic attitudes resulting in a curious demeanour of ridiculous vanity.

They never take a true interest in persons, things, or events; they are lacking in initiative. If commanded, they obey, when capable of comprehending the command and of acting thereon, although in some cases they absolutely refuse to do so.

Incapacity to appraise things and events, through absence of images of contrast, due to great poverty of the memory, explains the great number of apparently criminal acts committed by such phrenasthenics, and the accessions of rage to which they are subject. Some react violently and ferociously on refusals to satisfy their wishes, as, for example, in the classic case of Calmeil to which Marc makes reference. One imbecile whom I examined in prison and found submicrocephalic had struck his mother for a trivial reproof she had given him. Sometimes imitative outbursts occur—*e.g.*, an imbecile, seeing his sister beaten by her husband, assaulted

the latter with an axe, which was found in his hand, and injured him so severely that he died from his wounds two days later. (Emminghaus).

In the high grades of idiocy and in imbecility a due significance may even be attached to the words *wrong*, *punishment*, *forbiddance*, but such significance, instead of being abstract, is always associated with the memory of actions done by the individual himself and with the punishment and torture suffered in consequence.

It is needless to spend many words in showing that the emotions of phrenasthenics never reach that high grade of evolution that renders possible the fusion of the individual emotions with those of the social environment, by means of which the normal man attains the highest summits of sentimentality. In all grades, the emotions are ever elementary and primitive; in the higher evolved they find expression in egoistic sentiments. Sometimes even the most fundamental emotions, such as those of hunger and of thirst, are wanting, or are rudimentary or roughly outlined (Bourneville). In some cases they are expressed only by a cry. An idiot, sent to my clinique from a large hospital in the city, cried at the top of her voice every time she was hungry, until they gave her food with a spoon, or put into her hand pieces of bread, which she devoured ravenously. She used to remain quiet for hours, so long as she felt no appetite, and then she would commence her loud cries.

The highest sentiments of the most evolved phrenasthenics have the appearance of altruism; yet the attachment or apparent tenderness of phrenasthenic children to their mothers or some other relative is immediately connected with the pleasure and satisfaction of the fulfilment of all their requests, which the poor mothers often divine. The piety of the majority of imbeciles is imitated in its exterior mechanism, or connected with the suggested fear of fire and the devil.

Chastity, especially in women, is likewise imitated. Maffei mentions a good example in the case of a young imbecile who was unwilling to expose her chest to the doctor who had to examine her, yet soon afterwards went outside the entrance to the house to urinate, exposing herself without concern to the people who were passing. The obedience of many imbeciles arises from their mechanical type of nature; their personality does not manifest itself with any strong desire or with any intrinsic and endogenous energy.

The morality of many imbeciles who neither steal nor react, who support in peace and with patience even angers and injuries, is only apparent; the fact is that they experience no desires, nor do they feel the emotions that sway every evolved person, such as personal dignity, humiliation, etc., or the desire is weak, fleeting, overcome by the fear of punishment, unaided by all those intellectual resources by which the normal man seeks in every way to escape from it.

From this point of view we must distinguish two classes of phrenasthenics : (1) The moraloid, who are those of whom we have just spoken ; (2) the immoral, who are very dangerous beings, inclined to falsehood, theft, calumny, vagabondage, idleness, want of discipline : they are violent, obstinate, stubborn, pretentious in one sphere of ideas and desires, very limited in another. We have, for example, the timid, fearful imbecile, who tells the truth because, like a child, he is unable to formulate a lie with readiness, especially when it is concerned in the avoidance of punishment ; the imbecile who respects the property of others with the fidelity of a mechanism, and the imbecile who steals ; the imbecile who does not love at all, either platonically or sensually, and the lascivious imbecile who, without any regard, seizes persons of the other sex, be they his own sisters or his own mother, without a shadow of chastity and without giving any thought to the dangers, damages, and inconveniences. Emminghaus reports the well-known case of Rösch dealing with an idiot who from time to time attacked his own mother in an accession of erotic fire, and from whom she was liberated only after a great struggle ; the unfortunate woman had to shout at the top of her voice till her neighbours came running up, and succeeded with blows from sticks in liberating her from her beastly and lascivious son (remarkable resemblance to the asses). I have at present in the asylum a young imbecile whose confinement was called for principally because in the night-time, in the evening, and sometimes during the day, when one of his sisters was in bed and he supposed her asleep, he used to approach as openly as if fulfilling a perfectly approved action, and without a shadow of chastity attempt to vent upon her his lascivious desire.

The female imbecile, if not watched, often takes to vagabondage, to idleness, and runs after men, carrying on the most barefaced prostitution.

Such differences in sexual behaviour in idiots and imbeciles are certainly related to the frequency of anomalies of the organs (Bourneville and Sollier, '*Des anomalies des organes génitaux chez les idiots et les épileptiques*,' *Prog. Med.*, 1883). Idiots do not show any jealousy ; imbeciles, like monkeys, are very jealous. Many of them, however, are very suspicious and malicious (the most evolved).

A true sentiment of commiseration is not demonstrable in imbeciles, although its attitude is imitated.

I have never met with any feeling of solidarity amongst the lowest and middle grade imbeciles. The imbecile is not moved in sympathy with the joys or pains of others ; on the contrary, he enjoys or laughs at a disaster, a scuffle, a misfortune, the sight of many excited and agitated people, and is pleased by the shouting, provided he be in a secure position and at a safe distance (Maffei).

The phrenasthenic is not courageous—as a rule he remains

unmoved in all the difficulties of life ; in the somewhat evolved idiots and in imbeciles fear is prevalent. Sometimes imbeciles appear courageous, but it is audacity rather than courage ; there is more impulsiveness than consciousness.

The elementary æsthetic sentiments, such as that of rhythm, are more frequent, and even in profound idiots the musical sentiment is frequently met with (*vide* Part II.).

Hereditary idiots possess these artistic aptitudes. Dagonet's idiot repeated uncomplicated airs on the piano ; Morel's idiot showed sufficient ability to play the drum : he was the son of a drummer.

In the lowest grades there is wanting even the sentiment of possession, which, in some idiots, flourishes under the anomalous form of collectionism, or of appropriation of what belongs to others, especially food and clothing ; when notions concerning possession do find a place in imbeciles, they are always more strongly developed as regards their own property than as regards that of others.

This mode of behaviour of the intelligence and the sentiments of phrenasthenics, who are to be considered not only from the point of view of degree, but also as regards the disproportionate development of one emotion or of some particular sense in comparison with others, explains the great differences in behaviour and the varied aptitudes, however rudimentary, of idiots in general and also of imbeciles. No matter how much we may wish to classify and group together, each one presents a different attitude, diverse instincts, tendencies, and aptitudes. The majority of true idiots lack grace in their attitudes, are dirty, squalid, and repugnant, unless great attention be paid to them. They have a heavy step, and do not raise their feet well from the ground (Andriani and Sgobbo) ; they are brutal, rachitic, and bent at the level of the shoulder ; they have a vague, uncertain look, with no vivacity. Sometimes they recall types of inferior races, such as the Mongolian type (Ireland). Many of them have special tics : one finds pleasure in spinning on his heel ; another sways himself continually in an antero-posterior direction ; another incessantly sucks his thumb or index-finger ; another cries like an animal at more or less regular intervals and with a certain rhythm ; others ruminate after their meals like ruminant animals (mericism).

As regards instincts and aptitudes, we find in some the instinct of nutrition and a certain capacity for the search and selection of food, while in others this instinct is defective ; some learn to hold a spoon and to eat with it, others use their hands, or put their mouths to the bowl in a repulsive manner ; sometimes, though not capable of handling and making use of the spoon, they employ their hands in taking hold of a stick, or in seizing the branches of a tree, up which they clamber (the microcephalic idiot studied by Samurini).

Some have the intuition of self-preservation, others have no

conception of danger, but will put a piece of glass into their mouth, take a knife by the blade, put their hands into the fire and burn themselves, and not hasten to get out of the way of vehicles.

In most cases idiots do not engage in games, but prefer solitude ; or even if the most highly evolved of them do take part in games, their movements are devoid of an intelligent participation. Whilst normal children associate, show inventive tendencies, vie with one another in muscular strength, in running, in wrestling, in making practical jokes at the expense of others, imbeciles and high-grade idiots display no such inclinations, do not participate in the merriment and pleasure which in the normal child is the outcome of his own stock of energy, stimulated by contact with other children. Imbeciles, however, are often found in gatherings of children, but there they show up their characteristic traits and their deficiencies, while the normal children make fun at their expense, delighting in mocking at, and passing witty remarks about, their weak companions, who scarcely ever understand the twofold meaning of the words and the figurative phrases ; on the other hand, they are violent and brutal because of the poverty of their intellectual resources, and very often through the suggestion of others.

If they go to school haphazard with normal children, they grasp almost nothing of the instruction imparted to them ; indeed, they cause disorder in the school. At the end of the year they represent a passive factor in the profit, and an active factor in the disorder, in the bad behaviour, the bad discipline, the negligence. The more highly evolved imbeciles sometimes take hold of the ridiculous side of occurrences and persons, imitate and exaggerate ridiculous poses, possess a good memory for anecdotes and words with a double meaning, and so cause amusement. Many of the buffoons of the medieval courts were imbeciles (Moreau de Tours).

The higher-grade idiot and the lower-grade imbecile may fly into a fury at the sight of men or animals from whom at some time or other they have suffered injury, and they may conceive revenge against them in narrated modes, as often happens in public-houses. If one of them has once seen a conflagration or has heard tell of a murder subsequent to an insult to his own person, he may act the incendiary or provide himself with a weapon to attack his adversary.

These criminal actions sometimes present the appearance of premeditated acts, whilst in reality they are not so.

True accessions of fury and passions are also very frequent in the lowest idiots—throwing objects violently to the ground, tearing their clothes, scratching their faces, yelling, etc.

Some show tendencies that are really atavic ; they cannot endure clothes or stockings, and they walk on all-fours. An idiot who was for years confined in the provincial asylum at Naples, before he was trained, used to take off his clothes and run about naked on all-fours under the beds. Antonini's idiot used to eat live

chickens, feathers and all, and it appears that he once gnawed away at the head of a live cat.

We must not end this summary of the mind of phrenasthenics without mentioning those others, much more highly developed, who might be considered normal intellectually, who go to school and learn, who reach the level of abstractions, who exhibit a normal development of language and employ it appropriately, and nevertheless are deficient, inasmuch as they show themselves incapable of that extensive co-ordination in the social relations by means of which normal youths succeed in procuring for themselves a means of existence.

Inconstancy is one of the principal characteristics of this group; they never persist in the direction of a chosen path. They learn a trade, and sometimes succeed in it, but they do not always attain the perfection reached by normal individuals; then, one day or other, they abandon the office, the shop, or the school, and pass a longer or shorter time in idleness, giving themselves up to vagabondage, almost as if the will were exhausted and their poor and faint imagination no longer capable of representing to them the problem of life. After a longer or shorter time, during which they would almost seem to have accumulated new energies, they determine to resume work, but of another nature: from a shoemaker's shop they pass to that of a carpenter, or they join the ranks of the porters at the harbour or the railway-station, or learn some other trade; but after some months, or it may be years, no matter what the nature of their environment, they are still found in a state of unrest.

Whether it is because their will becomes exhausted and they become incapable of the force which frequently is necessary for victory in a life full of obstacles, or because they realize their own inferiority in contact with the normal human being, this much is certain—that they are often taken by an irresistible desire to abandon the post which assures to them the means of subsistence.

If they belong to a higher social grade, as we call it, they pass into inferior surroundings without thinking of the consequences, but rather with ready complacency. If they are scholars, they soon abandon the school, and take to the sea or join the army, where they conduct themselves as undisciplined individuals, and very soon, their inferiority being recognized, they abandon their career in search of new employment. Everywhere critical or fanatical, proud or arrogant, timid or violent, always inferior, inapt, inadaptable, they live isolated and neglected, and end either by abandoning or by being expelled from the post they occupy, even when by good fortune they had succeeded in attaining it with a great effort.

In wealthy and aristocratic families the imbeciles of whom we are now treating show themselves to have a tendency to a dissipated, instinctive life, abandoning themselves to games, women, and

velvety. Their principal characteristic is the more or less evident absence of the marks of good breeding. Their mind is sterile as regards all that should form the objective of a rich and well-bred family. Their brain is not a suitable soil for the most advanced culture, and they are therefore incapable of providing adequately for their future. In the enjoyment of to-day they take no heed of expense, and in a short time go through even large fortunes. Their tendency to indulge in stupid ostentation (and even in this they reveal the poverty of their mind) is well utilized by the astute, who speculate on their credulity and suggestivity. From amongst the many examples I might cite, I here give a brief record of one only, that of a young man of a wealthy aristocratic family, who allowed himself to be persuaded by coachmen and rogues who surrounded him to drive in a carriage with the very best of horses. The speculators provided everything, and he believed that the value of the carriages and horses surpassed twelve or fourteen thousand lire, while it was only three or four (credulity, suggestivity). As he had not the necessary ready-money, and those who had designs upon him had an eye to his rich paternal inheritance, they made him subscribe a bill of exchange for thirty thousand lire in return for a value of three or four thousand lire. A short time afterwards the same persons persuaded him that he ought to give up his carriages, because for their maintenance he had already been obliged to sign bills for many additional thousands of lire. He gave orders to sell the carriages and horses, but realized scarcely a hundred and fifty lire, and never once complained of such a bad transaction. In the course of two or three years this young man (and I know several similar instances) had squandered his paternal inheritance of three hundred thousand lire, having spent effectively no more than thirty thousand. A prominent characteristic of this class of imbeciles is that they are not at ease in their family and in their own environment, but find themselves perfectly *à son aise* in the lower social strata, where the conversation does not demand that mental effort and that patrimony of culture which are the necessary equipment of a modern well-bred man. In this environment alone do they find repose, comfort, and ready adaptation; here they are not bound to any effort, either intellectual or moral. Alcohol, lewd and designing women, complete the picture.

Tonnini, in a communication to the congress of the Italian phreniatrists held at Rome in 1894, spoke of social imbeciles corresponding to those I have just described; and Venturi, in the last booklet he published before his death, expressed very truly the idea that, in proportion as the human understanding evolves and culture advances, many remain behind in the forward movement for which the strong prepare themselves, in order to attain the advantages that civil progress offers them. They are the weaklings who, in their individual and sometimes even in their family history, do not

reach the normal level of the culture-curve of the epoch ; or if, indeed, the family attains to a normal height, it soon descends again by the path of degeneration. Primitive or degenerate, they are weak in comparison with society animated by the cultured spirit of the time.

To the gradations of intellect correspond, in a certain manner, gradations of speech. In this study we may retrace the whole history of the development of language. Idiocy permits us to detect all the regressive formations of speech, in a manner somewhat corresponding to the evolutionary formations of language of the modern infant (*vide ante*). In imbecility (if we wish to hold to the distinction previously mentioned), we may meet with all the gradations of the linguistic patrimony corresponding to the evolution of thought and wealth of language in humanity and the modern child, gradations which find their counterparts in the primitive character of the thought and language of those who have always lived in the country ; in idiocy, on the other hand, we find regressive gradations, even in the structure of the word, down to the absolute incapacity to pronounce, it may be, even a single articulate sound, or down to the simplest expression of the primitive emotions, most frequently very obscure, with an inarticulate vowel-sound which varies in different idiots from the feline mew to the amorous jabbering of the *ciasma cynocephalus*. Even when they possess a rudiment of language, idiots mar long words of three or four syllables, because the very simple structure of their nervous system does not allow as extensive and complex a co-ordination of combined movements as that which a long word necessitates.

They, like infants, simplify the sounds and abbreviate the words. One idiot among the number examined by me did not say *tavolino*, even when I studiously repeated the word to him, but *talin* ; instead of *patata* he said *tata* ; *acco* for *albicocco* ; *li-li* for *libro*, etc. Others are capable of pronouncing only one syllable of the word, the easiest or the most accentuated—*pa* for *pane* ; *vi* for *vino* ; *be* for *bere* ; *to* for *dottore*. Sometimes with a great effort and with long education, perchance, they become able to add another syllable to the monosyllable. One idiot who had learnt to recognise the doctors and to assign to them the word *dottore* (doctor), although he was incapable of distinguishing one doctor from another and the superintendent from the assistants, was able after a long time to pronounce *dotto* ; thus he was able with continuous exercise to form a small capital of bisyllabic words, which he pronounced, as a rule, in association with images of objects and persons.

The same long gradation that we have met with in the evolution of thought exists in the evolution of language, in such a way that, with respect to normal language, idiots and imbeciles present, in addition to the poverty of their vocabulary, corruptions in the formation of the word, which in all cases are a proof of a defect of

development not only of the central but sometimes also of the peripheral organs—throat, mouth, lips, tongue, in the structure of which lies a defect of that harmonic co-ordination which a function so delicate and complex as that of language demands.

Occasionally, and more especially in imbeciles, language as an outward expression is well developed, so that they pronounce all words perfectly well, but sometimes do not know their signification.

This holds good more particularly for words denoting an abstraction, of which they understand nothing, and in the pronunciation of which they find merely a phonic or senso-muscular satisfaction; or they associate therewith a simple concrete image, sometimes even very different from those that as a rule constitute the abstract idea. Hence it arises that the language employed by some imbeciles is not only meagre, but also wanting in precision.

From an anthropological point of view, idiots more especially, imbeciles in a rather less degree, present all, or a conspicuous number of, those degenerative stigmata which I have briefly indicated in the preceding chapter, and which I do not deem opportune to repeat at this point.

I cannot, however, entirely neglect to mention here those that are most frequent, and some almost characteristic; thus, microcephaly, hydrocephaly, ultradolichocephaly, unilateral or bilateral microphthalmia, albinism, blindness from pigmentary retinitis and opticatrophy, deaf-mutism from atrophy of the acoustic nerves, anorchism, monorchism, rudimentary or undescended testicles, too small or very large penis, epi- or hypo-spadias, atrophic uterus, vaginal septum, hermaphroditism, polydactylism, and rudimentary hand, all anomalies denoting a defect of evolution not only of the brain, but also of the entire organism, and especially of the sexual apparatus, as well as that of the nervous system.

As regards disturbances of the sensory, motor, and reflex spheres, there are recorded deafness, blindness (Ireland's phrenasthenia from deprivation), motor paralysis, hemiplegia, diplegia, paraplegia, with increase of the tendon reflexes; progressive myopathies; often a certain muscular hypertonicity. Save for the increase of the deep reflexes in the paralytic phrenasthenics, these phenomena present no appreciable alteration.

Instead of giving more particular descriptions of such morbid forms, it is preferable to report some cases observed in the asylum, amongst which I have selected a microcephalic, an epileptic, and a paralytic idiot, representing three great groups of this numerous family of degenerates.

OBSERVATION I.: IDIOCY AND PROFOUND MICROCEPHALY.—San. R., admitted November 22, 1897. He has one sister, also microcephalic, but not an idiot to the same marked extent. No family history.

Anthropometry.—Height, 1·34 metres; large aperture of the arms, 1·41 metres; circumference of the thorax, 0·81 metre; length of the sternum, 0·145 metre; length of the abdomen, 0·245 metre; bisiliac diameter, 0·130 metre; right half of thorax more developed than the left; from the median line of the sternum to the spinous apophyses of the dorsal vertebræ, passing immediately below the mammary nipple, on the right side, 0·410 metre; on the left, 0·390 metre. Marked lordosis in the dorsal portion of the vertebral column. Inability to completely extend the arms in crucifixion attitude. Great development of the two acromion processes of the scapulæ, impeding the complete upward movement of the two arms.

Cranium.—Dia. ant. post. max., 149 millimetres. Dia. trans. max., 107 millimetres. Med. long. curve, 223 millimetres. Trans. curve, 213 millimetres. Total circum., 440 millimetres. Ant. semi. curve, 217 millimetres. Post. semi. curve, 223 millimetres. Sum of the three curves, 876 millimetres. Right lateral semi. curve, 215 millimetres. Left lat. semi. curve, 225 millimetres. Height of forehead (very depressed), 48 millimetres. Dia. front. min., 85 millimetres. Dia. bizyg., 105 millimetres. Height of face, 107 millimetres. Cephalic index, 71·88 millimetres.

The cranium is very small as compared with the face, which is relatively very large. It may be said that the frontal part of the cranium is completely wanting, for it is so flattened that the frontal bone, retreating abruptly, seems to form a very acute angle with the base of the cranium. Ears small, pinna flattened, Darwin's tubercle present, and lobules adherent; the left situated at a lower level than the right. Nose large, and very broad at the base. The palpebral fissures are directed downwards and inwards. Teeth irregular and asymmetrical, temporal muscles very highly developed. The scalp has a decidedly pachydermatous character; absence of hair on the chest; mammary nipples well developed; penis large, prepuce large and long. The left testicle alone has descended into the scrotum. General sensibility is torpid. He does not react to slight tactile stimuli; to painful stimuli he does, but the threshold of pain is evidently far removed from the normal. He is afraid of the noise of the tuning-fork brought close to his ear; he is pleased with the tick-tack of a watch, which he at once puts to his ear if he is given it in his hands. It has been impossible to ascertain to what extent he can distinguish colours. Taste and smell appeared quite rudimentary.

Cutaneous reflexes are normal, so also is the conjunctival reflex. Those of the auditory canal and the Schneiderian membrane are sluggish. Patellar reflexes are somewhat increased on both sides.

Motility.—He walks with slow steps, with the trunk inclined forwards and the body curved. He moves as one piece, without elasticity or suppleness of person. He is always torpid under any stimulus whatever; always slow, inefficient, and awkward. He is fond of smoking; if he is given a lighted cigar, he puts it in his mouth, imitates the usual movements of the lips, and assumes a certain stupidly pretentious air, but he does not know how to co-ordinate the movements for the aspiration of the smoke, at which he makes ridiculous attempts. If, again, he is given a box of matches, after several attempts he succeeds in opening it, but takes a long time to get hold of a match between his fingers, does not then know how to ignite it, and ends by offering the match to another, making signs to him to do it; and if he is given the match lighted it is easier for him to burn himself than to light the cigar. A certain resistance of the voluntary muscles to passive movements is noted, especially in the upper limbs.

Physiognomy.—Vacuous and stupid. Occasionally he smiles, never does he weep. He perceives objects in common use, but very many things

pass under his senses unobserved: he gives no sign of having noticed them. He orientates himself in space, for he moves with some determined object, and even so far as displays the recognition of objects referring most immediately to his needs. For example, he recognises foodstuffs, and up to a certain point is able to select from amongst them those of which the flavour appeals to him most, and which he always prefers. When the differences between two objects are not very evident, he is incapable of distinguishing them—*e.g.*, after having eaten a piece of sugar, he puts in his mouth a piece of chalk, and does not spit it out until after he has ground it with his teeth. If various objects are placed before him on the table—a halfpenny, a key, a watch, a small mirror—he does not concern himself with the bright objects, as might be expected, but invariably runs straight for the money with outstretched hand. Money must certainly reawaken in his mind the memory of the satisfactions which it had been able to obtain.

As is evident, the attention is extremely weak. The sensory attention is limited and confined to a few things; it is impossible to speak of voluntary attention: that is entirely wanting. Almost nothing is capable of arousing his interest, excepting perhaps money, watches, and certain fruits. He may be made to hear the most varied sounds, to see the most varied colours; he may be confronted with objects that very readily excite infantile curiosity without manifesting by voice or physiognomy any sentiment whatsoever, or any desire, be it ever so weak, of obtaining possession of them. He takes a firm hold of objects placed in his hands, but if deprived of them displays the utmost indifference. I do not recollect any cry of displeasure or of rage.

The psychic activity is almost exclusively limited to ideas and desires relative to food. Mechanically, monotonously, he repeats his habitual refrain—accompanying it with a gesture of the hand, as of a person imploring—‘Give me some bread.’

The altruistic affective sphere is completely obliterated. There predominates only a certain egoism which is translated into the persistent demands, accompanied by cadenced moans, that are the expression of the stimulus of the desire to eat. The entire emotivity of this subject is reduced to the most elementary expressions of pleasure and of pain. When he is given anything that pleases him, or when any nurse who takes a more than usual interest in him approaches, his physiognomy, as a rule stupid and immobile, gives an indication of a smile in outline, as it were, but it does not manage to make itself evident as in the normal individual. He also employs some guttural sounds that resemble grunts to express a certain feeling of contentment by which he is dominated under certain circumstances. Again, from time to time, at longer or shorter intervals, days or weeks, he suffers from attacks of bad temper, manifested by louder and longer groans and by attempts to bite his arms and hands, to tear his clothing, especially those parts of it he manages to get hold of with his teeth, and, if he happens to be eating, by throwing away his bowl and spoon. Sometimes these impulses are provoked by excessive annoyance caused by other impertinent patients, but as a rule they are without apparent cause, without evident external stimuli. Very probably he expresses in this manner the somatic disturbances that he cannot otherwise manifest; they may be regarded as the reflex of the abnormal centripetal waves issuing from one or other of his organs, seeing that it is not possible to attribute to them any ideative representation, however elementary.

It is possible to note a certain expression of pain when his food is taken from him whilst he is eating and still very hungry. For the rest, one may take away the halfpenny of which he has obtained possession or remove the cigar from his mouth whilst he is smoking without his

making any complaint. Not infrequently he falls asleep in his chair or remains motionless for many hours.

The phonic manifestations are reduced to mere groans and a few articulate sounds—in fact, almost exclusively to *no*, *u*, *pa*—by which he expresses alike his desire for food and his request for a halfpenny. He appears to say *vo be* when he is thirsty.

He eats voraciously, using his fingers; often, if not watched, he devours such a quantity of food that he ends by vomiting. No sign of awakening of sexual life; no epileptic attack.

OBSERVATION II.: IDIOCY WITH INFANTILE SPASTIC HEMIPLEGIA AND EPILEPSY.—D' Ang. Carm., from Q. (admitted to the wards February 23, 1896). Paternal grandfather and grandmother, as also maternal grandfather, died of acute diseases; maternal grandmother still enjoys good health at a very advanced age. Father and mother of very limited intellectual development. The mother is affected with goitre, but not in a marked degree; she frequently suffers from fæcal stagnation, and often so severely as to be confined to bed, sometimes for a whole month. She is keenly sensitive, as she says, to moral impressions, especially if unpleasant; at such times, in fact, she is thrown into an almost convulsive condition, in which her whole person trembles and her teeth chatter, as though overwhelmed by an intense feeling of cold. The father is a well-doing, industrious man, fond of his family, incapable of saying a word not perfectly correct, attached to the Church, and very devoted to the saints. Of eight sons, two died at an early age from acute affections; all the others are well. One of them it has been possible to see, and he also has a goitre, not well developed. It must be mentioned, however, that in Q. the persons suffering from this affection are very numerous. The patient was healthy until eleven months old, when the mother one day noticed a swelling in the infant's neck. At the same time violent convulsive attacks supervened, during which the head and eyes were turned markedly to the right side. It is not known if fever was present, but it is certain that hypodermic injections were administered by the physicians, though it cannot be said what drug was employed. During the convulsions the patient had vomiting and involuntary passage of fæces. He remained hemiplegic on the right side. From that time forward the patient has been seized with convulsive attacks of the same nature every two or three months, these being frequently preceded by an intense feeling of cold. The duration of the attacks is from half an hour to six hours. There follows invariably a longer or shorter period of drowsiness and then of depression.

He has always been of a savage, violent, and impulsive nature. It was sufficient to interpose an obstacle in the way of any of his actions to see him react in the most violent manner. Even his father failed to restrain him, for he offered resistance to him also, and if he saw that he was not going to have the upper hand at close quarters, he settled the matter by retiring to a distance and throwing stones at him. He had no sense of shame; in his home he was a continual source of scandal to his sisters, before whom he fulfilled his needs with the utmost indifference. Having thus become the terror of the neighbourhood and the torment of his family, his parents decided to have him sent to the asylum.

Cranium.—Diam. ant. post. max., 173 millimetres. Diam. trans. max., 136 millimetres. Cephalic index, 78·61 millimetres. Median long. curve, 332 millimetres. Transverse curve, 265 millimetres. Total circumference, 498 millimetres. Ant. semi. curve, 235 millimetres. Post. semi. curve, 263 millimetres. Right lat. semi. curve, 229 millimetres. Left lat. semi. curve, 269 millimetres. Height of forehead, 43 millimetres. Diam. front. min., 100 millimetres. Diam. bizygomat., 107 millimetres. Height of face, 115 millimetres. Facial angle, 68 millimetres.

Degenerative Anthropological Characters.—Microcephaly, scaphocephaly, plagiocephaly; forehead low, narrow, receding; occiput flat; eyes sunk deeply (the ocular bulb seems somewhat diminished), slight convergent strabismus. Plagioprosopia: zygomata highly projecting; asymmetrical lop-ears set at different levels, the right being the lower; very marked development of the penis.

The entire right half of the body at the very first glance seems much less developed than the left. Not only the muscular system, but also the skeletal part is affected. The following measurements reveal the degree of shortening of the bones:

1. Distance from the top of the acromion to the top of the epicondyle on right side, 280 millimetres; on left, 290 millimetres.

2. Distance from the upper extremity of the elbow to the tip of the styloid apophysis of the radius on the right side, 250 millimetres; on the left, 290 millimetres.

3. Distance from the styloid apophysis of the elbow to the top of the middle finger on the right side, 155 millimetres; on the left, 183 millimetres.

4. Distance from the top of the great trochanter to the external epicondyle of the femur on the right side, 350 millimetres; on the left, 350 millimetres.

5. Distance from the upper extremity of the fibula to the top of the external malleolus on the right side, 353 millimetres; on the left, 395 millimetres.

The measure of the circumference, taken in the most prominent points, gives the following results: Right arm, 182 millimetres; left arm, 220 millimetres; right forearm, 190 millimetres; left forearm, 210 millimetres; right thigh, 370 millimetres; left thigh, 395 millimetres; right leg, 240 millimetres; left leg, 255 millimetres.

Tactile sensibility on the left side is normal, but the localization of stimuli is under normal, being made with a certain tardiness. This defect is much more evident on the paralyzed side.

Only marked thermic differences are appreciated. The sense of pain is diminished, more particularly on the right side. The muscular sense is diminished on the paralyzed side; with the eyes closed, he executes fairly delicate movements with the upper and lower limbs on the left side; the movements of the corresponding parts on the right side are not so precise.

The various pleasant and unpleasant odours are not differentiated.

Sweetness is distinguished exactly; the other three fundamental tastes (acid, salt, bitter) are all regarded as bitter.

The plantar reflex is a little sluggish. The cremasteric reflex is more easily elicited on the left side; the abdominal and the axillary are very pronounced.

The pupillary reflexes are sluggish. The patellar reflex, the reflexes of the tendon of Achilles, the flexor muscles of the hand, the triceps extensor of the forearm, and the periosteal reflexes, are somewhat more pronounced on the right side. On this side also the foot phenomenon can be obtained.

Gait limping. In the act of walking, the right foot is raised very high (resulting from the greater development of the left lower limb), is thrust outwards, then brought inwards, as if he wished to execute a sickle-like movement, and finally put down rather vigorously on the ground.

Convergent strabismus. The movement of the ocular bulb to the left side is incomplete, or, if performed, is maintained only for a moment. Movement towards the right side is more sustained. The ocular movements upwards and downwards are normal.

All the combinations of attitude and of physiognomy that reveal the various states of mind are in him sought for in vain. His facial features are dull and listless. In his ordinary state the eyes are inexpressive, the lips half open, the cheeks wrinkled or flaccid. Sometimes thick and viscid saliva trickles from his mouth (this seems to depend partly on the abundance of the secretion); mucus flows from his nose, but he never thinks for a moment of wiping it.

The movements of both upper and lower limbs on the right side are incomplete; athetosis is present.

The muscles of the arm and of the forearm react to the faradic current, but on the left side in a slightly lower degree.

Force on the left side, 35; on the right side he cannot displace the index of the manometer. The muscular force in both flexors and ex-



FIG. 63.—IDIOT WITH INFANTILE SPASTIC HEMIPLEGIA.



FIG. 64.—ANOTHER HEMIPLEGIC IDIOT.

tensors of the forearm on the arm, and of the leg on the thigh, is markedly diminished on the right side—in the upper limb to a greater extent than in the lower.

Psychic Functions.—The patient recognises many of the objects in common use, and, if sometimes unable to indicate them by name, shows, nevertheless, that he understands clearly the purpose they serve; it is precisely on this account that, when he fails to remember the name of any object, he often employs a roundabout form of speech, and, *e.g.*, calls spectacles 'the things for the eyes.' At other times, when the perceptions are a little more complex, he is capable of gathering only some of the features, and hence arise incomplete and erroneous judgments; thus, a pen becomes a *stick*, the inkstand a *little bottle*. For a like reason, being incapable of discerning the points of difference of similar objects—those which serve to distinguish them from one another—he generalizes, and a coin of five or ten centimes, or the nickel coin of twenty centimes, or the silver one of one lira, are all indifferently *soldi* to him. He recognises, however, the two-centime piece, perhaps because the children of the lower classes are wont to be possessed of that money.

Spontaneous attention is always very poor; there is no truly active and voluntary direction of it. He is capable of remaining for whole hours with vacant countenance, either in bed or seated always in the

same position, merely turning his face from time to time to one side or the other, evincing no curiosity or any interest in the external world.

If haply some object comes under his observation, he often brings himself to contemplate and recontemplate it as one enchanted; sometimes he takes it into his hands, but, after having turned it over several times, abandons it, either to resume his accustomed attitude or to set himself to contemplate some other thing. He evinces greater curiosity and greater interest in any object that stimulates his senses more vividly than another. Thus, the tuning-fork has commanded his attention so far as to induce him to take hold of it, to put it close to his ear, and to manifest, by his face and his speech, his great wonder when the vibrations have died away.

The mnesic field is very much restricted. On interrogating him on every point and by every means, that which most readily comes up again in his conversation (which, on the other hand, is not easily understood on account of marked defects in language) is the recollection of some of his country habitudes, and nothing else.

Indeed, he remembers only his Christian name, and is ignorant of his proper surname; he can tell the name of his country, but does not know the name of his father or mother, who by him are called simply *tatta* and *mamma*.

He has learned the names of the numbers, but repeats them mechanically and without order, since he does not understand their value, as may readily be shown. Thus, on showing him some soldi and inviting him to count them, he commences indifferently at 3, 5, or 8, proceeding capriciously, let us suppose (as on one occasion he did), to 25, 6, 8, 14, 12, 10, 50, 45, and so on. On suggesting to him the first number 1, he proceeds well enough up to 9, but on going further he begins to get confused. He is unable, of course, to tell how many fingers or how many coins are shown to him at a time.

The ideative content is very meagre. Ideas, besides being extremely limited in number, are simple and incomplete, showing no connection with one another. There is no spontaneity of thought; he does not utter a single word unless when interrogated, and he will stand mute before one for any length of time. Further, his vocabulary is extremely restricted. One by one, he pronounces well all the letters of the alphabet (the sound of *l*, however, approaches to that of *r*; the pronunciation of *d* closely resembles that of *t*), but in the union of the different syllables whence results a word, the latter is more or less markedly faulty in structure, the more so the more complex the word is. Of these we transcribe a few examples: *bacio* is pronounced correctly; *pane*—*pa*, *pan*, *pande*, *nde*; *gatto*—*catto*, *tatto*, *to*; *chiave*—*chiade*, *ngfe*, and finally *chiave*; *portogallo*—*cardo*, *cattido*, *potnga-l-lo*, *pot-ugal*; *capello*—*cappeldo*, *catpelo*, *cappello*; *storia*—*stor*, slipping the *r* a little; *sedia*—*seda*; *memoria*—*bolla*, *bollo*, *mello*, *bor-ro* (slipping the *r*); *tavola*—*ta-lo*; *callo*—*calo*, *cavo*, *cadevo*; *mano*—*ma-mo*, *mo*; *orribilmente*—*ob-mente-orrepe*, or else an irreproducible sound; *zucchero*—*zucche*, *zucque*.

The sentiments are reduced to the lowest and most egoistic that are directly connected with satisfaction of the instinct. He shows no affection for the persons who come most in contact with him.

If sometimes an accession of sympathy is awakened in him, he is unable to show it except in the most primitive manner, leaping upon one, pawing one over, clutching one's clothes so as almost to tear them off, grasping one by the hand and shaking it energetically, accompanying the actions with almost convulsive laughter, which at bottom is reduced to inspiratory and expiratory yells. The sufferings of others make him happy; on making, in front of him, a pretence of striking some other person, he rejoices and smiles thereat. The greatest expression of satis-

faction animates his face when he is reminded of the scratches he made on another patient who held him tightly whilst he was being examined with the faradic current.

He is then animated to the extent of not being able to refrain from again assuming the attitude he took on that occasion, presenting the appearance of wishing to scratch, and laughing loudly the while. As a rule, he passes the day either seated carelessly in one place, or, what pleases him more, lying at full length in bed, indifferent to everything and everybody. His presence would remain unobserved if he did not from time to time call attention to himself by giving vent to yells very like the bellowing of the ox.

Sleep and appetite are very good.

OBSERVATION III.: IMBECILITY.—Cam. M., from Giugliano Campania, aged thirty-nine; unmarried, domestic, moderately competent, hardly able to read and write; admitted to clinique November 12, 1894.

The father appears to have died as the result of a traumatic lesion. He was a well-doing, credulous man, but so weak in character as to be completely under the control, first of his wife, then of his sons.

The mother is a woman of uncommon and sordid avarice. She is alive and well. She has had a family of six.

A paternal and a maternal aunt died insane. The eldest sister, though perhaps of no greater mental development than the sons, was so persevering and artful as to take into her own hands the reins of domestic management, surpassing the mother in meanness and stinginess, going the length of depriving her poor old father even of his coffee and tobacco, obliging him to smoke dried leaves.

Another married sister has had two children, one of whom died of eclampsia.

She has three brothers, all generally of limited mental development. One of them, in fact, got on so badly at school that he could not be got to say Mass till over thirty years of age.

Our patient seems to have gone on developing regularly till her fourteenth year, but as she became older her intelligence did not make corresponding progress. She remained the childish simpleton that she had always been: dolls, toys, and games always succeeded in attracting her.

There was a time when her relatives entertained thoughts of her marriage, and a young man desired to espouse her. But after a little time he perceived what type of woman he was about to marry, and very soon broke all agreements. Her parents state that this fact made a very deep impression on the girl; but the result that more certainly ensued was that from that time forward, although not abandoning her childish behaviour, she became more conceited, announcing to persons who had no desire to know it that she was going to marry now one person, now another.

Meantime her strange conduct was not intolerable, and she went on more or less unobserved up to a certain age; as she advanced in years, she commenced to attract more attention. She was without discipline, and could never be made to understand that what she was doing did not well become a young woman of her age. Every opposition to any caprice on her part provoked an uproar. There was no gathering of boys in which she did not take part; no person died but she went to attend the funeral services, remaining blissfully enchanted by the candles and the psalmody of the priests; did a marriage take place, she was there among the wildest boys to compete with them in gathering the confetti thrown on such occasions, according to the customs of the country. She learned to work well at sewing, but serious occupations had certainly no attrac-

tions for her. She took a delight in, and had an affectionate word for, the kitten and for the pup, with which she held long and interminate conversations. Shortly before she was admitted to the asylum her favourite kitten died, and she conceived the strange notion of arranging a funeral for it in every detail, and had it carried in procession through the whole countryside, followed by a number of children whom she succeeded in bringing together. Too late did her friends come to hear of the affair (of which she craftily had let nothing leak out) to avoid the laughter and derision that threatened them on all sides. It was this affair that exceeded the limits of endurance of her relatives, and induced them, for the sake of their future peace and the honour of their house, to request her admission into the asylum.

Cranium.—Diam. ant. post. max., 165 millimetres. Diam. trans. max., 137 millimetres. Cephalic index, 83.03 millimetres. Med. long. curve, 295 millimetres. Trans. curve, 265 millimetres. Total circum., 480 millimetres. Ant. semicurve, 230 millimetres. Post. semicurve, 250 millimetres. Sum of the three curves, 1,040 millimetres. Height of the forehead, 52 millimetres. Min. front. diam., 92 millimetres. Bizygomatic diam., 88 millimetres. Height of the face, 111 millimetres. Facial angle, 74 millimetres.

Stature low; cranium small.

Plagiocephaly (forehead flattened on the left side); forehead small, somewhat receding; ears implanted unequally, the left being lower; some abnormal hairs, particularly on the outermost parts of the upper lip; dental diastem between the canine and the first molar of the superior dental arch on the left side.

Tactile and thermic sensibility almost normal. Sensibility to pain is altered; punctures with pins, though sufficiently deep, do not provoke ready reactions on the part of the patient. The algometric tests show the threshold of pain to be very far from the normal.

The gustatory and olfactory sensibilities are poorly developed. Sweetness is not distinguished by the patient, either in the anterior or the posterior region of the tongue, when the solution is not very sweet; if, however, the solution is saturated, she perceives the sweetness, which is more strongly felt at the posterior part of the tongue. Bitterness is also more distinctly perceived towards the base of the tongue. Solution of acetic acid is hardly perceived at all posteriorly.

The patient does not distinguish the various odours, but, on the other hand, many of the unpleasant odours (such as that of a weak solution of ammonia, of illuminating gas, of asafœtida) are regarded by her as pleasant. She distinguishes strong colours, but not the shades: she does not know their names; she does not distinguish violet.

The pupillary reflexes are a little sluggish; all the other reflexes are normal. In general, all the motor manifestations are somewhat torpid; no disturbances in the general motility.

Force, measured by the dynamometer, is very weak: on the right, 15; on the left, 13. She is evidently incapable of volitional efforts.

Psychic Functions.—The perceptive process is weak; all the ordinary and common perceptions are conserved, but the same cannot be said of those of a higher order. For example, although during the whole day she is surrounded by persons exclusively of her own sex and only sees the doctor once or twice in the day, she has never asked who he is nor what he comes to do. On asking her, she at first expresses a very general idea: 'You are a young man: you are a gentleman.' On persisting in the inquiry, she makes still another distinction, but always general and superficial. In fact, being a country girl, the first distinction that comes into her mind is that between a Giuglianese and a Neapolitan; and, as she has never seen the doctor in Giugliano, she adds, 'You are a Neapolitan.'

After many insistences and demands, she decides at last to add, 'You are perhaps a lawyer.'

Our lady superintendent, whom she sees also many times a day, is a 'Signora' in whose room the 'mistresses' meet together (for so she regards a good number of the nurses). Sensory disturbances of any kind have never been observed during the entire period of her residence in the asylum.

Spontaneous attention is fairly active, but wanders continually from one thing to another, or becomes suddenly distracted by other stimuli or images recalled by new perceptions, through frail and superficial associative connections. Provoked attention may be aroused without much difficulty; but whenever she has commenced to launch out her idle chatter, it is well-nigh impossible to stop her at once, to induce her to speak in an ordinary fashion on some given event, or to make her change the subject.

The memory of past as well as recent events is faint, summary, and unprecise. She is unable to tell how old she is (she states she is twenty-seven, while in reality she is thirty-nine); she does not know how long she has been in the asylum (she says about seven months, whilst it is now over fourteen); she has not yet learned the names of the nurses, not even of those in her ward; if she remembers any one of them, it is because she has known her in the country, and has been familiar with her from her infancy. She has not acquired a clear idea of time. The events that she narrates to us are recounted as though the years in which they happened—even approximately—were of no importance. Her points of rendezvous are not indeed the months, which she says she doesn't know, nor the years, but the holidays of her country and the fruits which the earth gives in determined seasons. For example, she says, 'I came here when the grape season was past.'

Spontaneous ideation is facile, but disordered. Associative bonds are unstable and superficial. Ideas are not well defined, often erroneous; judgments sometimes false, sometimes strange, always superficial. She is exceedingly credulous; it is sufficient to tell her some foolish thing in order that later on she may tell it over again in the most solemn manner. For example, she says at present that she is not the daughter of her mother, but of the Madonna, and that she was taken from the shelter of the Virgin Mary, for she has 'been told so.' In her continuous chatter there is a prevailing manifestation of ideas referring either to her own personality or reminiscent of all the things she possessed when at home.

A thousand small facts, a thousand useless details, a thousand follies, she intersperses in her discourses. 'Once I was beautiful and had rosy cheeks. I possessed many earrings, wore small boots, and had lots of dresses; mamma had lots of money, and she made it secretly for herself. I had a lover, and he was so beautiful that he could see himself in a glass of water; he killed thirty pigs; he sold cornelians and olives; he sold red, white, and black bread, and what he sold nobody else succeeded in selling; and he shut the shop on Sunday;' and so on. Finally, the recollections of so many things make her express suddenly this strange longing, 'How I like chestnuts!'

The sphere of the highest affections gives no active manifestations. She never goes to Mass here, because 'our chapel is not worth admiration.'

The reminiscence of the country awakens in her no loved memories; affection is not stirred by the image of her mother nor the recollection of the family; it is, instead, the *fêtes* that she recalls—the illuminated streets, the playing of the bands, the firing of the guns, the vendor of ices, the church all flooded with light, the Madonna with the heavenly robes and the beautiful eyes.' It matters but little to her whether her relatives come to visit her or not. The questions she puts to them have to do,

not with the family, but the *cat*, the reason why they did not bring her toys, and so on. On the contrary, in fact, she maintains towards her mother, brothers, and sisters a feeling more akin to hostility than anything else, because she remembers only blows and reproofs from them. Sexual desires are not manifest.

The æsthetic sentiment is rudimentary; of the moral sentiment nothing can be said. If she commits no wrongful actions, it is because of the absence of desire or of the representation of the necessary images. There is no trace of true inhibitory power.

Of an insuperably lazy character, she passes the whole day either in blissful idleness, basking in the heat of the sun, or intent in taking part, with the other patients, in childish pastimes, passing whole hours in playing with small stones or with pieces of linen, paper, and so on. Nothing but the meal-hour can distract her from her favourite occupations, and then she makes continual complaints that her portion is always the smallest and the worst of the lot. Nevertheless, if she is not observed, in a moment afterwards it will all have disappeared. She is not concerned about her lot—'It is so much better to stay here than at home.' Here she enjoys blissful idleness, the garden, and the sight of so many people; at home toil, reproofs, and blows are her portion. Her only complaints are that she has been deprived of the toys she brought with her, and that she never gets dishes for which she has a preference.

Appetite very good. Sleep always good. Occasional dreams, but of no importance.

I have purposely included here, among the clinical reports, a case of pure microcephalic idiocy with infantile spastic hemiplegia, because it is necessary to recognize one primary distinction of *simple phrenastheniacs* and *paralytic phrenastheniacs*. The former, no matter what the degree of psychic development or the teratological signs, present neither sensory nor motor paralyses referable to circumscribed or diffuse lesions of the nerve-centres; the latter, however, no matter what the defect of evolution of the psychic life, present, in addition, motor or sensory paralysis, always referable to a limited or diffuse anatomo-pathological process in the brain. These cerebral lesions, as we shall shortly see, are of the most varied nature (hydrocephalus, meningitis, encephalitis, sclerosis, cerebral thrombosis, cysts, porencephaly, etc.), and are either complications of the defective evolution of the brain or else have themselves led to an arrest of cerebral development owing to the consequent destruction of a more or less extensive and important part of the organ of thought, and to the functional and nutritional disturbances induced in other parts of the cerebral organ that have functional and anatomical relations with the part destroyed.

In this second group of phrenasthenias, in addition to the general symptomatology relating to the psychic functions and the abnormal psycho-somatic evolution, there is always present a group of symptoms produced by the circumscribed or diffuse cerebral disease. Of these I shall mention only the most frequent and important—viz., hemiplegia, paraplegia, diplegia, the syndrome of Little (with all the characteristics of the cerebral paralytic forms and the long train of phenomena accompanying them), contractures,

symptomatic chorea, athetosis, exaggeration of the deep reflexes (infantile cerebroplegias), strabismus, atrophy of the optic papilla due to infiltration of fluid into the sheath of the optic nerve (hydrocephalus, meningitis), or to descending degeneration of the optic path from profound lesions of the occipital lobes, the optic thalami, and, in some cases, Friedreich's disease, etc.

In the majority of these cases we meet with another important symptom, viz., epilepsy. Even when the epileptic convulsions do not accompany and complicate the symptomatology of the diplegic phrenasthenias, they are found to coincide with that period in the history of the illness during which arose the anatomo-pathological process that complicated or generated the imperfect and anomalous development of the brain. Especially is there found a history of inflammatory processes, the various forms of encephalitis and meningitis, in the symptomatology of which we almost always find eclampsia (infantile epilepsy), which may henceforth continue as epilepsy throughout life, or remain latent, sometimes for a longer, sometimes for a shorter time, returning again in childhood, adolescence, or maturity, to impress its stamp on the already miserable existence of the phrenastheniacs. Sometimes the epilepsy is recognisable only in the moral character it gives to the psychic life, as we shall see hereafter.*

Still one other form of idiocy has to be distinguished from the common form just described—viz., *myxœdematous* or *pachydermic idiocy*, called also (in my opinion improperly) *sporadic cretinism*. Myxœdematous idiocy is a congenital or acquired (always infantile) form of myxœdema, just as ordinary idiocy is a congenital or infantile form of amentia. It is observed throughout Europe and America. Whether it be congenital or developed after birth, the clinical figure appears clearly recognisable between the second and sixth year. Save for the lips, the large tongue, the relaxed and thickened skin, and a sort of fatty swelling in the neck, the affected infants show no more certain signs of the disease, which becomes more pronounced as the little patient advances towards childhood and adolescence.

When the disease is well developed the appearance is characteristic. The development of the body is slow, and becomes arrested before reaching the normal limit. The stature is low, the body thick-set; the face is large, and seems flattened; the

* For the semeiological particulars of the infantile cerebral paralyses—hemiplegia, diplegia, syndrome of Little—I refer the reader to the special treatises and monographs: Bianchi, 'Treatise upon the Diseases of the Brain' in the *Patologia Speciale* of Maragliano and Cantini; Tanzi, 'Sui rapporti della cerebroplegia infantile coll' idiozia,' *Rivista di Patologia nervosa e Mentale*; Massalongo, 'Le diplegie cerebrali dell' infanzia,' *Policl.*, 1897; Seppilli, *La paralisi cerebrale infantile*, Torino, 1898; Pennato and Berg-hinz, *Le cerebropatie spastiche infantili*, 1899; and many others.

head, as a rule, is small and flattened at the vertex (one of Tanzi's cases presented macrocephaly); the nose is large and flattened at the root, the point turned upwards; the eyes seem very distant from one another, the eyelids thick and heavy; the lips are thick, the tongue too large, and projecting from the mouth; the milk-teeth are cast very early, and the appearance of a second set is long delayed; the limbs are short and thick, hands and feet dumpy; lordosis and lateral curvature of the spine are present; the neck is short, the abdomen large; the genitals are not well developed, true infantilism being present in both male and female; menstruation is absent or late. The skin is swollen, too ample for the body, hard and resistant, and of an earthy colour; the hair is



FIG. 65.—MYXÆDEMATOUS IMBECILE.

scant and bristly; in the axilla and on the pubis it is absent or scant and hard, occasionally downy. *In the majority of cases the thyroid gland is absent.* In the posterior part of the neck we frequently find large deposits of fat, resembling true lipomata or pseudo-lipomata, and occupying also the supraclavicular fossæ. The circulation is slow, the temperature low. There is great poverty and torpor of all the mental manifestations, as in idiots of all grades.

One of the patients described by Tanzi was at fifteen years of age incapable of standing erect or of walking. She neither laughed nor wept, neither called out nor articulated a single syllable.

In the slighter cases of simple *myxædematous imbecility*, such as that described by Brissaud (very rare), the intelligence may develop sufficiently, and the morbid picture be limited to all or nearly all the somatic manifestations.

This form may be found even more attenuated, giving us the myxædematous infantilism described by many, especially by Brissaud, Thiebierge, Tambroni and Lambranzi, and Agostini. Here we have to deal with an attenuated myxædema, owing to a less severe affection of the thyroid gland, not truly congenital, but setting in during the development of the infant. In the first—that is, in the classic myxædematous idiot described by Bourneville (in Italy by Tanzi)—there is present in a noteworthy degree arrest of skeletal, sexual, and intellectual development, together with the characteristic myxædematous syndrome, consisting especially in the marked cutaneous dystrophy with solid œdema. In the attenuated form, on the other hand, there is wanting or hardly

noticeable the solid cutaneous œdema ; the skin, in fact, is fine and clear, the face wrinkled ; the cutis may be raised in large folds ; the œdema, whilst absent in other parts of the body, may be limited to the hands and feet. The lipomatous nodules are more or less abundant in the supraclavicular regions ; the hair is fair, the eyebrows scant ; there is absence of hair on the face and the pubis ; the nose is small, the cranium irregular, and hypsocephalus frequent (Agostini) ; the thyroid body is small ; all the other psycho-somatic factors are as in myxœdematous idiocy. It appears that in some cases the solid œdema may be present for a time, and then disappear. These are the demyxœdematized myxœdematous.

Personal observation, as well as the publications of Ireland and Thiebierge, has led me to recognise many varieties of the colouring of the skin and the œdema of the body and face ; but neither is it possible nor does it serve any useful purpose to classify them. Some may be assigned to the group of those suffering from long-standing myxœdema, others cannot, and of these some belong to the type well described by Lorain—stature very low, limbs slender, muscles thin and hypotrophic, abdomen batrachian, cranium more or less irregular, as seen in rickets. Some adult heads present an infantile appearance (syphilitics).

Other patients, again, belong to a decidedly different type. They present no sign of myxœdema ; they may show signs of giantism or of dwarfism, but have a white skin, sometimes coloured, limbs and body in proportion, nose small and straight, cranium regular, no conspicuous stigmata of degeneration, a sufficient intelligence. They are not at all repugnant, save for the fact that they have no hair on the face or on the pubis, and they have rudimentary sexual organs, with complete absence of the sexual instinct. At thirty years of age they look no older than fourteen. I have observed one of thirty-five years, a chemist's assistant, with skin of a rosy white colour, beardless, and with light-brown hair, absence of hair on the chest and pubis, cranium submicrocephalic but regular, stature rather high, voice effeminate and rather shrill, sexual organs rudimentary—testicles the size of kidney beans, penis little more than three centimetres long, and the size of an ordinary goose-quill. Intelligence was developed as far as the grade of the feeble-minded, with the characteristics of timidity. He was fond of solitude ; there was complete absence of sexual instinct. It is the asexual phrenastheniacs who, by a gradation which we cannot follow, imperceptibly merge into the sexual perversions of which we shall speak in another chapter.

Imbecility is often complicated with the juvenile forms of myopathy described by Pilliet, Collier, Vizioli, Landon Downen, Kesteven, Mondio.

Pathological Anatomy.—Under this heading we have to distinguish between the two great classes—idiocy and imbecility.

One class comprises all those very numerous cases in which the development of the brain is incomplete, stopping short at some stage in the evolutionary scale, and in life its extremes are represented at the top by the feeble-minded, constituting the borderland with the sane, and at the bottom by extreme degrees of pure microcephaly. In this class there are no true anatomic-pathological alterations, but a deficiency in the number of, and a defect of evolution in, the nerve-elements, owing to an initial deficiency of germinative energy. In the second group exist lesions either of an extensive nature or distributed in foci, these occurring at some period or other of intra-uterine life, or in the early periods of extra-uterine life, and arresting the development of the injured hemisphere, and also, in a less degree, that of the other hemisphere, so that the whole psychic life is arrested in its evolution, or retarded and injured. In the first group epilepsy is rare, in the second



FIG. 66.—PORENCEPHALY: EXTERNAL ASPECT.

frequent. In the former, psychic weakness is not accompanied by focal functional disorders; in the latter, organic residua of the cerebral lesions always exist—spastic hemiplegia of infancy, diplegia, hemianopsia, deafness, atrophy of the optic papillæ, etc. In the one we have small size and greater simplicity of the convolutions, absence or a rudimentary condition of some of them, more frequently of the third frontal and of one or more of the communicating gyri, thus giving rise to prolongation of some of the fissures, total or partial absence of the corpus callosum, etc.; in the other we meet with foci or other processes with manifest consequences on the rest of the brain, differing in individual cases according as the malady arises during the intra-uterine period, or at the beginning of extra-uterine life, or in a brain further evolved.

When a destructive focus arises in the cerebral substance of the foetus, or perhaps in the earliest months of extra-uterine life, the convolutions assume quite a peculiar disposition in rays, as observed in porencephaly (Klebs, Kundrat, Bianchi, Ferrier), and

as D'Abundo has demonstrated by experiments on the brains of dogs and cats (D'Abundo, '*Atrofie cerebrali sperimentali*,' *Annali di Neurologia*, 1902). In these cases the products of the focal lesions are absorbed, giving rise to porencephaly, communicating or not, as the case may be, with the lateral ventricles. The accompanying figures are taken from a case of porencephaly in an imbecile with infantile spastic hemiplegia, but without epilepsy.

In such cases, when the lesions affect the motor zone, the spinal medulla likewise presents defective development, or a smallness of the anterior cornua and of the pyramidal columns corresponding to the injured hemisphere (aplasia or hypoplasia).

In the case of simple primary arrest of development, the gray substance is thinner, the nerve-cells fewer in number, less perfect, and provided with fewer prolongations, and the associative paths less numerous. We do not know if cells in process of development



FIG. 67.—PORENCEPHALY: INTERNAL ASPECT, LATERAL VENTRICLE OPEN.

exist under the forms corresponding to the phases of evolution of the nerve-cell first described by Fragnito (*Annali di Neurologia*, 1902). The neuroglia is everywhere more than normally developed, the neuroglial cells more numerous, the nuclei more abundant.

In brains belonging to the second group the lesions found are of the most varied nature, and are regarded as the residua of preceding meningitis: turbidity, thickening of the pia, internal and external hydrocephaly, residua of infective encephalitis, plaques of sclerosis, cysts, or old softenings of various extent and in the most varied situations in one or both hemispheres.

Sometimes the ventricular hydrocephaly has assumed such a proportion that the hemispheres have become a sack, and both the white and gray substance much attenuated (Tamburini's case). At the same time, there exist the most diverse alterations in the process of ossification of the cranial bones: retarded ossification of the sutures and formation of sesamoid bones (D'Astros, *Les Hydrocéphalies*, 1898).

Again, we may find—and perhaps it is the most frequent condition—premature ossification of the sutures, a fact that has led surgeons to believe, contrary to all good reason, that craniotomy may facilitate the development of the brain, as if the latter were hindered in its development by the inextensibility of the cranial box.

One of the most frequent findings is that form of encephalitis described best in recent times by Pellizzi. It consists of a form of hypertrophic sclerosis in the form of extensive plaques at one or several parts of a convolution, preferably in the frontal lobe of one or both sides, resistant to the touch, of a whitish-gray colour, sometimes projecting above the level of the normal convolutions, composed for the most part of dense bundles of neuroglial fibres

containing rare cells, more or less deformed and altered in structure (Pellizzi, *Studi clinici e anatomico-pathologici sull' idiozia*, 1901).



FIG. 68.—MICROCEPHALIC IDIOT OF OBSERVATION I.

Microcephaly, then, may be simple or combined. The microcephalic brains in pure microcephaly, even of the most extreme degree, writes Giacomini, always preserve the special stamp of the type to which they belong, and develop always in the same direction. They contain a smaller number of cells, which are smaller than usual and furnished with fewer prolongations. The axis-cylinders are less numerous, of smaller calibre than usual, and less ramified. In one case among many described by Bournéville and

Wuillamie, the brain, which, exclusive of the cerebellum, weighed only 640 grammes, presented no sign of any pathological process. The convolutions were simple and elementary. It was a sort of diagrammatic brain, such as is prepared for demonstrations in the lecture-room.

On the other hand, microcephaly may be found combined with all the anatomico-pathological processes just recorded. These either complicate the microcephaly at a later stage, inasmuch as the brain of the microcephalic individual is much more predisposed to the development of all these diverse forms of inflammatory processes which we recognise as belonging to the pathology of the brain, or such processes, developing for some time in a brain which might probably have evolved in a regular manner, hinder its normal development. In this way we may divide microcephaly into combined microcephaly, so called, and into consecutive microcephaly.

The brain in pure microcephaly may present an extraordinarily small volume. In one of Giacomini's cases it weighed hardly 170 grammes, in another 323 grammes, in a third 405 grammes.

The microcephalic of Observation I., whose death occurred whilst I was writing this chapter, possessed a brain with a total weight of 384 grammes. The accompanying photograph shows the cerebellum projecting behind the border of the occipital lobes and exposed to view; it is also seen to be very simple (Fig. 69).

The frontal lobes show the least development, the third left convolution being totally wanting, whilst the third right is scarcely noticeable. The Rolandic zone is relatively small, the para-Rolandic lobule is rudimentary; the first temporal convolution is also relatively small. The visual zone is better developed; the lingual lobule, however, is almost wanting.



FIG. 69.—BRAIN OF THE MICROCEPHALIC IDIOT OF OBSERVATION I.

At a first examination of microscopic preparations of the cortex, the nerve-cells appear much fewer in number than in normal brains, especially the pyramidal cells, which are smaller and simpler (Fig. 70). The spinal medulla also presents marked anomalies, which would require a detailed description.

In Donaggio's case, corresponding to the symptoms met with in life, and resembling a mild form of the syndrome of Little, there was found at the post-mortem, in addition to general microcephaly, the most marked hypoplasia of the whole pyramidal system—smallness and scarcity of the pyramidal cells of the Rolandic cortex, protoplasmic prolongations less numerous and less ramified, the axis-cylinder prolongations more attenuated and less ramified, rarefaction of the fibres in the anterior two-thirds of the posterior segment of the internal capsule, in the feet of the cerebral peduncle, and in the crossed pyramidal bundle. There

was a noteworthy diminution of the calibre of the nerve fibres.

This fact is not to be wondered at, because in many cases the microcephaly is not uniform. Certain parts only of the brain may be wanting or rudimentary. The entire prosencephalon was wanting in the brain of the microcephalic observed by Stani (reported by Giacomini). The corpus callosum and the olfactory

lobe were absent from the brain of an idiot examined by Onufrowicz. Many other examples of a like nature might be adduced.

In cases of both pure and spurious microcephaly one often finds micromyelia, which as a rule is primary and concomitant with the microcephaly, total (Giacomini, Mingazini, Donaggio) or unilateral.

Ætiology.—All the causes of insanity in general may be causes of phrenasthenia. The most important and direct are: mental weakness of the genitors, which, again, may be a phase of family degeneration initiated in some antecedent generation; advanced age of the genitors; intermarriage of blood relations belonging to psychopathic families; moral perversion of the genitors; syphilis of the mother during gestation, or syphilis acquired during lactation; the giving of wine to infants, common in certain families, especially alcoholists; and, in my opinion, also the use, very common in some provinces of Italy, of infusions of poppy, with the object of soothing the

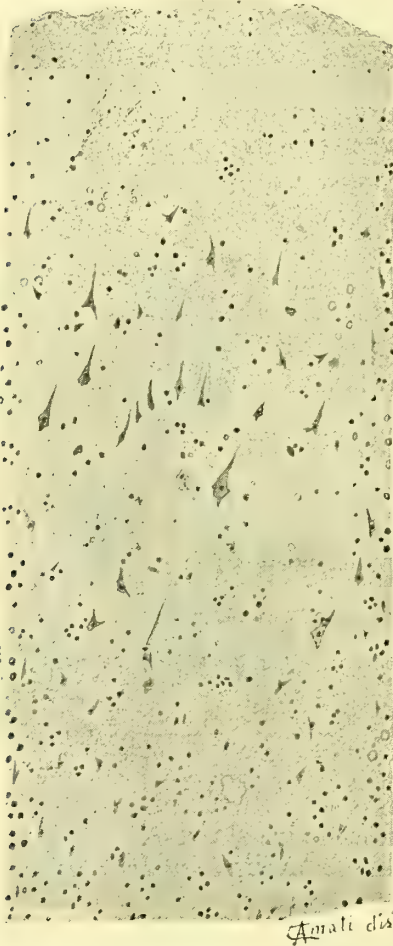


FIG. 70.—SECTION THROUGH THE FOOT OF THE SECOND FRONTAL CONVOLUTION.

infants during the day, whilst the parents are at work. All these are frequent causes of phrenasthenic states. The same may be said of some infectious diseases during pregnancy, and of chronic malarial and pellagrous infection (Ceni, Agostini), and not infrequently of tuberculosis of the genitors, as has been lucidly demonstrated by Maffucci and others, who have compiled statistics of the frequency of tuberculosis among idiots (Piper,

23 per cent.; Kalin, 56 per cent.). Injuries of the fœtus during pregnancy and difficult parturition, with prolonged compression of the head and consecutive lesions (meningeal or even cerebral hæmorrhages), and injuries to the head after birth, are perhaps among the most frequent causes, apart from heredity, of the arrest of development of the brain. These were found 698 times by Wulff in 1,436 phrenastheniacs, in 9 per cent. by Piper. Amongst the causes of insufficient cerebral development there is also to be included premature parturition, spontaneous or provoked, which sometimes is accompanied by the syndrome of Little (*vide* Gehuchten, Soury, Mondio).

Alcoholism possesses a strong genetic influence on idiocy. Féré has produced at will monstrosities of embryos by injecting a few drops of an alcoholic liquid under the shell of an egg in course of incubation. Methylic would be much more injurious than ethylic alcohol, and the latter less than absinthe. The researches of Féré and those of Martinotti, although partly contradicted by those of Mirto, are of great value. Statistics give a percentage of idiots from alcoholic genitors of from 62 per cent. (620 in 1,000 idiots examined in Bicêtre by Bourneville) to 11.38 per cent. (Kind).

Destructive foci arising through syphilitic thrombosis or acute encephalitis lead to the same result by a different mechanism (*vide* Tanzi, Seppilli, De Sanctis, and Bianchi, 'Treatise of Diseases of the Brain,' in the *Patologia Speciale* of Cantani and Maragliano).

Prognosis.—The prognosis of well-manifested phrenasthenia is always very grave. It is only phrenastheniacs of the highest grade who can be brought into such a condition as to prove in a less degree a family and social burden, thanks to particular curative and pedagogic methods. Such phrenastheniacs, more or less disciplined and corrected, may learn trades or become adapted to useful employments. In the section for the mentally deficient at Bicêtre, directed by Bourneville, very many of them are employed in the most diverse handicrafts, earn a part of what they consume, and become disciplined and governable.

Many others, consisting of those of inferior grade, are not educable to the point of giving any useful product. In general, idiots who are unable to speak or attain possession of a rudimentary language are not educable. Those, on the contrary, in whom language is developed, be it ever so poor, offer greater probabilities of ulterior development. The hereditary phrenastheniacs who do not fix their rudimentary attention on anything, and who manifest destructive tendencies, other conditions being equal, are less educable than those who are better behaved and more capable of directing their attention. Microcephalics suffer from more serious conditions than hydrocephalics. I have met with infants exhibiting marked listlessness and paralysis of the inferior limbs as the result

of severe hydrocephaly, who with the lapse of years have so developed mentally as to be admitted to the secondary schools. The slight degrees of hydrocephaly which give rise in infancy to a syndrome of phrenasthenia sometimes ameliorate to an extraordinary extent in childhood, and, in fact, in adolescence the subjects concerned belie the characteristics of their infancy, showing a lively intelligence, sometimes even above the average. A noted case is that of Helmholtz, whose brain showed at the autopsy the residue of the hydrocephaly from which he suffered in infancy.

Paralysis, blindness, or deafness occurring as complications aggravate the prognosis.

The conditions of the epileptic phrenastheniacs are still more serious. Epilepsy *per se* is capable of arresting the psychic development, and of perverting it at an early period in the social relations.

In arriving at a prognosis the clinician must not neglect the examination of the economic and moral conditions of the family of the phrenastheniac, inasmuch as well-developed intelligence of one of the parents, the care that thoughtful and intelligent mothers take of their infants, a good habitation (light and airy), simple and well-regulated nutrition, are all factors which, other things being equal, facilitate the psycho-cerebral development. As regards locality, I must add that intensely malarial districts, where the majority of the inhabitants have enlarged spleen and a certain degree of anæmia, are veritable nurseries of imbecility, and consequently do not offer conditions favourable to the future of phrenastheniacs.

Therapy.—The most fertile field for a rational medical interference is certainly that of prophylaxis. Since the majority of the causes of idiocy and phrenasthenia are known to us, we should cry out loudly against multiplication of cumbersome and useless beings. Marriage, which is not an individual function, but an eminently social one, should be prohibited amongst imbeciles, epileptics, old, mentally decayed, and lascivious men who marry young women attracted by the mirage of a fine economic position, amongst habitual alcoholists, uncured syphilitics, and neuropathic blood-relations. It is true that imbecility sometimes co-exists with incapacity to fecundate, on account of profound chemical and histological alterations of the sperm (own observation), even when copulation is normal; but it is also certain that very many do fecundate, and it would be well that the law and a well-directed education of the people should provide modes of preventing the multiplication of inferior beings. The diminution of alcoholism and the prophylaxis of tuberculosis and syphilis would have a beneficial influence on the number of weak-minded individuals in Italy.

Pregnant women must avoid intense emotions and physical traumata, especially on the abdomen. Obstetricians must pre-

occupy themselves a little more with the application of the forceps and with premature parturition, also weighing carefully in their judgment the remote consequences of their practices upon the cerebral development of the offspring. This will be another means of prophylaxis of phrenasthenia.

Such is the ideal of the prophylaxis of mental weakness, but we have seen that the acquired forms are many. Prophylaxis, then, will but succeed at most in diminishing the number, but never in entirely ridding society of idiots and feeble-minded persons. For these is necessary a suitable curative and educative treatment in appropriate asylums.

Society must protect the deficient, and at the same time stand surety for them. To provide an asylum and a school for these mal-endowed individuals whenever the family has not the means to provide for their subsistence, treatment, and education, is a supreme duty of the State and of the public administrators. That all phrenastheniacs are not educable is only too true. For such, asylum treatment is rendered necessary by the repugnance which the profound idiot excites and by the mockery and the danger to which he is exposed. The educable always forms the subject of a long examination and laborious judgment, because the task of the clinician is, first, to define the degree of development of the idiot ; second, to inquire into his inclinations, his tendencies, and attitudes that are relatively more developed and capable of being brought to the point of utilization, and, in addition, his latent tendencies. Many deficient persons belonging to the highest group of imbeciles are, as already mentioned, dangerous either because they are eminently susceptible to suggestion or too obstinate and superficial in their inconsiderate resolutions, hence victims of subterfuge on the part of the astute, and for them also the prudent guardianship of the law is requisite.

Others are extremely excitable and mobile, lose their serenity and directive capacity under the influence of trifling oppositions, or face with olympic tranquillity dangers which any normal person would avoid, not to mention the paring down process their fortunes undergo in the hands of scheming individuals. Others are passionate, litigious, stupidly captious, are aroused by trifles, initiate ruinous projects, and, as though overwhelmed by an imperious monoideism, continue to carry them out, notwithstanding evidence of the wrong or the advisability of giving in. Thus they dissipate their fortunes. Others are excessively talkative, cavillers, mischief-makers, slanderers, liars, or extremely jealous individuals ; if women, egoistic, negligent of their elementary duties, badly behaved. In all these cases the law and the physician should intervene, because, after all, imbecility may be likened to a tree passing through all the grades of development, and branching off into moral insanity, paranoia, hysteria, and should be considered present

in the various forms of criminality, besides all the grades of paranoidism.

It is these imbeciles who are readily classed amongst the normal that society must be protected from, even purified of. The law provides for the less hurtful. Medical science must furnish more precise and certain data regarding those in particular whose diagnosis is more difficult, and of whose abnormality it is a more arduous undertaking to persuade the legal or lay magistrate, especially when there is the intervention of experts who are not very fastidious or who adapt psychiatric doctrines to diverse interests.

It is well to bear in mind, however, that each case requires individual study, because, since many imbeciles and weak-minded persons are useful, and maintain their position well in the social world, the doctor and the magistrate in their judicial relations should not be authorized to judge them all alike.

Good nourishment, passive and active gymnastics, massage and electricity, all the tonics like the glycerophosphates, iron, cod-liver oil, are means adapted to facilitate, within the limits possible, the evolution of these deficient organisms. When idiocy is complicated by or dependent upon inflammatory processes in the cerebral meninges, repeated applications of vesicants to the head and treatment with iodine will prove useful. If there is good reason to suspect the existence of syphilis, recourse will be had to mercurial treatment.

If complicated with epilepsy, it is necessary to add the administration of proportionate doses of bromides. If there is hydrocephalus, besides the ætiological treatment for the diverse genesis and the various forms of hydrocephalus, mercurial and iodine preparations, vesicants to the head, will be equally useful, and we may also have recourse to surgical intervention for the puncture of the sac of the dura mater, and even for the drainage of the lateral ventricle.

The myxœdematous form is treated by the internal or hypodermic administration of thyroid juice, or by tablets of thyroïdine, not neglecting all the other conditions indicated by the general therapy of these states.

CRETINISM.—This is an arrest of psycho-somatic development which presents itself in an endemic form in some well-known regions of Europe and America, but it is likewise sporadic. It has somatic features by which it is readily distinguished from the other forms of phrenasthenia, and is of toxic origin.

Symptomatology.—The majority of cretins are born with the particular sign of the disease. Sometimes, according to some observers, a small goitre exists from birth. The head is large and irregular, the fontanelles are larger than normal, the forehead narrow, low, and covered with hair, often bristly, the face short, the root of the nose indented, the nose flat, the eyelids appearing cedematous, heavy, and not covering the anterior part of the ocular

bulb as in healthy children. The face seems swollen, often of an earthy colour; the mouth large, the lips thick, the tongue thick and often protruding; the body thick-set, the abdomen large, the fingers short and thick, the spine slightly curved, sometimes the long bones of the lower limbs curved; the skin thick, pallid, cold, cyanotic, especially in the extremities, appearing sometimes to form a sac too large for the contents (Virchow).

The development of the body is both slow and anomalous. The irregularities in the head become more pronounced as development proceeds. The ossification of the sutures is retarded, as also that of the fontanelles; the goitre is also more pronounced. Meanwhile, on the functional side, it is noted that the movements are listless, prehension slow, walking much delayed, the physiognomy inexpressive, even somnolent, the eyes being half closed and the eyelids listless. The stupidity and the languor are unbroken by any of those mutations which in infancy and childhood express the very ready and rapid motions of the mind—grief, joy, fear, anger, impatience, etc.

The development of the body, besides presenting irregularities, becomes arrested. The stature of cretins is much below the normal. Their teeth are anomalous in number and form; they decay early, fall out, and are sometimes not renewed. Many do not walk before the sixth or seventh year; the upright position is not certain before the second or third year. Speech, nearly always very poor and defective, develops, if at all, more slowly than walking. Deafness and blindness (not rare) complete the picture, from which the reader may form, with the aid of the imagination, all the gradations from the lowest to the highest, from both the somatic and the psychic point of view; and it is to be added that in cretinism we can have all the modalities known in idiocy and imbecility, for the general symptomatology of both idiocy and imbecility is perfectly applicable to cretinism. Thus it is that, in exceptional cases, we may have a cretin who is adroit, heretical, malicious, as compared with the majority, which is composed of torpid individuals. In the same way, while most of them are of low stature, in rare cases they may show a real giantism, a point to which Lombroso first called attention. These cretin giants sometimes reach a height of over 2 metres (one of them observed by Lombroso measured 2.59 metres), and have a relatively small head.

As regards the development of the senses, we may refer to what has already been said of idiots and imbeciles. It seems, however, that the hearing of cretins may very frequently be dull and sometimes absent.

The Sardinian Commission, constituted for the study of cretinism in Savoy and the Valley of Aosta, divided cretins, from the psychic aspect, into three categories: (1) The *cretins*, properly so called, those in whom life is almost limited to the vegetative functions;

their intellect is rudimentary; they have no speech and no reproductive activity. (2) The *semicretins*, who enjoy both the reproductive faculty and a rudiment of language; the sensory activity is more developed, and they can satisfy their wants with a very limited aptitude. (3) The so-called *cretinous*, or *cretinoids*, in whom, in addition to some of the somatic features described and the constant presence of an intellectual deficiency, mind and language, though not reaching normal limits, are yet so far developed as to enable them to adapt themselves in very different ways, and to learn various handicrafts more or less satisfactorily, so that these weaklings succeed in securing for themselves a regular means of livelihood.

Eclampsia, hydrocephaly, rickets, hernia, are frequent complications of cretinism.

Ætiology.—We have already said that cretinism is endemic amongst the heights of Savoy, in the Valley of Aosta, amongst the high Pyrenees, in Styria, in Carinthia, Alsace, in some regions along the course of the Danube and the Rhine, in the Caucasian districts, in some parts of Derbyshire, and in certain regions of Asia and America. In all these fairly well circumscribed districts or zones cretinism coincides with the frequency of goitre (a fact already demonstrated by Lombroso). Goitre is also frequent in some communities of the province of Naples which give a non-negligible cipher of cretinoids. It appears that sporadic cretinism is becoming more rare since these communities have enjoyed the advantage of the purer water of the Serine.

It seems certain that cretinism is due to the drinking-water. A few also are inclined to think to-day that the air contributes to it. Micro-organisms are not exempted from the ætiology of cretinism (Klebs, Bircher, Lustig, and Carle).

It is certain that domestic animals which drink the same water and breathe the same air present goitre and the phenomena of cretinism. Dogs, horses, and especially mules, are torpid, stupid, and goitrous.

It is not yet definitely decided whether the toxins exert their influence solely on the thyroid body, and through the latter indirectly upon the nervous system, or whether the action upon the thyroid body and the brain is direct and simultaneous. This much is certain—that in cretins alterations of the thyroid body are constant, the glandular parenchyma being either entirely absent or greatly deficient as the result of degenerative or inflammatory processes occurring therein (Cristiani). The close relationship between the thyroid (or parathyroid) body and the cretinic syndrome is conclusively proven by a great wealth of experimental facts associated with the names of many clinicians and experimenters, among whom we may mention in particular Munk, Horsley, Vassale, and Capobianco.

The *prognosis* of cretinism, under equal conditions, is less grave than that of idiocy (Guggenbühl and others), inasmuch as the removal of the family or of the infant who is commencing to exhibit signs of cretinism from the place where the disease is endemic to a more healthy locality, in most instances brings about a remarkable amelioration, and determines a more regular psycho-organic development. This is abundantly demonstrated by the fact that the improved hygienic conditions in certain localities of Switzerland, France, and Germany have, during the last decade or two, brought about a remarkable reduction in the number of cases in those regions.

The treatment of cretinism can only be ætiological. So long as the conditions determining it persist, there is no treatment that can be regarded as truly efficacious. The prophylaxis must not only include all that we have said with regard to the prophylaxis of the phrenasthenias in general, but also take into especial account the immediate and direct causes of endemic cretinism.

There can be no doubt that the wide distribution of healthful waters led in iron conduits into the small communities and districts where cretinism is prevalent, is to be regarded as a veritable source of health and strength. In the Campanian districts, as I have already remarked, cretinism is daily diminishing in frequency. The law should also make provision for the housing of some communities in the Valley of Aosta and the province of Cuneo, where the dwellings are worse than caves, entrance being effected on all-fours through a sort of hole. Treatment by mountain air, good nourishment, thyroid and thymus preparations, and all the known tonics, must be regarded as sufficiently efficacious.

CHAPTER IV

PARAPHRENIAS

THE conception of paraphrenia is not yet clearly defined in psychiatry ; rather does there exist a certain amount of confusion concerning the signification to be attached to the term and the morbid forms it should be made to include. Arndt, for example, understands by paraphrenia those forms of psychosis with psychic enfeeblement arising after the period of childhood, and terms the insanity developing about the time of puberty *paraphrenia hebetica*, or *hebephrenia*, and that occurring at an advanced age *paraphrenia senilis*, or *presbyophrenia*. This distinction leads to great confusion in our conceptions of the mental affections, the more so when we consider that the disease to which Arndt alludes is *paranoia hallucinatoria*, and that *paranoia puberum*, *paranoia mediæ ætatis*, and *paranoia climacterica*, would all be paraphrenias.

By paraphrenia I mean that form of defect in cerebral evolution manifesting itself in eccentricity, originality, and extravagances that give quite a particular stamp to the character of the personality, which may, however, exhibit superior intellectual qualities, sometimes attaining the level of genius.

The character, which sums up all the psychic activities of the individual and betrays itself in his conduct, is the resultant of the ideative process, the emotions and the sentiments, as well as the attentive and volitional power of the individual, and the relation between the conscious and unconscious form of his being. The attitude of the individual considered *per se*, and especially in relation to his environment, derives from the equilibrium of the various mental activities, in such a manner that the predominance of one and the defect of another are reflected on the behaviour and actions, which give in synthesis the individual psychic particularities.

As a rule, the perceptive process is also entirely altered in the so-called unbalanced or eccentric people, and even more so the process of apperception of the effects of certain acts, which would appear to be withdrawn from the law of co-ordination of the life of the individual with that of the social environment. All men

who live together, constituting a tribe, a nation, or a race, resort to imitation and adaptation, in order to conform their customs in general lines, in the most diverse manifestations of life, to those of the community. Slight and gradual alterations are introduced, such as all those useful modifications, representing disadaptations and new adaptations, which sometimes succeed in modifying even the instincts (Darwin).

In these successive modifications of the habits in adaptations that tend to create new habits more useful to the individual and the species, lie the reason and the mechanism of advancement and all future progress. If men were incapable of offering opposition to the law of misoneism (Lombroso), or to that of habit (James), life would be a mechanism governed by the laws of statics. All the expressive or elective part of life feels the irresistible consequences of the progressive character of the perceptive process, which every day brings us more into contact with new truths and new facts, which demand, through force of circumstances, new adaptations. The developmental or inherited elements of the character become co-ordinated with the ever-changing social and personal factors (Levy). By some, however, the personal factors would be regarded as the more important (Malapert, *Les éléments du caractère, et leurs lois de combinaison*, 1897). This explains why what is not really eccentricity sometimes appears to be so. I remember the case of J. Hanway, who was the first to introduce the umbrella into England, and for this innovation was pronounced eccentric, while soon afterwards its utility was recognised and its use became common.

Eccentricity consists at bottom in an absolute predominance of the individual factors, which originate from a developmental structural anomaly of the brain, causing a rupture of harmony between the individual and his environment. The mechanism of these anomalies is characterized by an alteration of the process of apperception or of association, by the predominance or the tyranny of certain emotional or non-emotional ideas, deficient or excessive emotivity, defect of voluntary attention and the predominance of automatism, or by a marked defect of regulative power. In all these cases eccentricity corresponds to the individual and collective futility of the conduct in its entirety, or in one of its manifestations which, on the other hand, clashes strongly with the prevailing custom, and accordingly finds no imitators. In the field of thought it is especially the strange association of ideas that determines the actions. Caporali, *e.g.*, believed he was avenging the supposed injury done by Crispi to the Pouille, by drawing a pebble over his face.

As the reader may judge for himself, eccentricity is always an expression of defect and want of harmony in the cerebral development, and may be found associated with all grades of intelligence,

from imbecility to genius. It is on the borderland of insanity, and manifests itself in the most fantastic ways—in the clothing, in the personal appearance, in the hair, in the style of writing, in speaking, in certain voluntary tics, such as lambdacism and rhotacism, with the idea of giving an affected grace to the speech. Exaltation of certain obsessive feelings, such as exaggerated zoo-ophily (*e.g.*, a lady who spends a part of her income upon and devotes the greater part of her life to cats and dogs, maintaining a large number for no purpose), the rabid opposition of some to vivisection, etc., are examples of eccentricity. Certain collectors of useless objects or of insignificant animate things, because of which such individuals often withdraw themselves from the sometimes pressing reality of life; some exalted religious or political monoideists, like certain anarchists and the majority of professed spiritualists; others who are fanatical in their strivings after a discovery which they believe very near and certain, such as the steering of the balloon, or their efforts in poetry and verse, which they pronounce sublime, assuming an air of superiority or inspiration; the misanthropes (less numerous now than formerly) who avoid the company of man, and pass their time at home enjoying a pipe and the good things of the table; the sordid, avaricious individuals, deficient in intellect and devoid of any sort of altruistic sentiment, who enjoy only the possession of money, and are torments even to their own families—all furnish numerous examples of eccentricity. To continue the enumeration would, I think, be quite superfluous. Anyone can see that eccentricity, in the sense I have expressed, may assume the most diverse forms, as many, indeed, as there are directions of thought, modes of feeling, and forms of action. It is necessary, however, to make some distinctions. Sometimes we meet with strong personalities that pay no heed to the customs of others, but go their own way. At other times we find a plausible pretext for the strange act—*e.g.*, getting into a sack of feathers on account of cold, and then regarding one's self in the mirror (Leopardi). In other individuals there is absolutely no object in view, as, for example, when they grow long hair, and allow it to fall over the face (perversion of the æsthetic sense, vanity, necessity of attracting attention to one's self, etc.).

Among so many originals and eccentrics we find a number of imbecilic individuals, also men of medium ability, and some most distinguished persons, such as Cowper, Shelley, Tasso, Leopardi, Lord Byron, and Wagner. The paranoic temperament, strong emotivity, immorality, sexual perversions, are often attributes of these bizarre, original, eccentric individuals, who rarely land in asylums, but whom, all the same, the man in the street recognises immediately he comes in contact with them.

Some of them betray a real want of equilibrium. They are dreamers, incapable of appreciating circumstances at their proper

value, or of finding opportune adaptations. There is a want of uniformity or of co-ordination of the conduct with the ends in view, or there is a defect in the proportional relations between thought and action, marked incapacity being exhibited in the latter. The psychic waves rise to a great height on some occasions, and fall to the level of indifference on others.

In their moods, their sympathies and antipathies—usually irrational—as regards both persons and things, they are extremely variable. There is no objective reason, no logic, in these strange and rapid variations of the mind. Strong desires, followed by facile renunciation of the objects which a short time before had raised their enthusiasm, are also psychological features of these strange beings.

Sometimes they have a vivid imagination, and become artists or orators; but though well endowed, they are incapable of succeeding in anything of real utility in their relations in life. They lack the capacity to weigh the stern realities of life; they are often deficient in rectitude and morality, however much they may appear to possess wide notions of morals.

Some of them are excessive enthusiasts in art, politics, and religion, or irreconcilables who contradict themselves and exercise a fierce tyranny. Among these I include those vegetarian fanatics who maintain that they can eat those vegetables that grow under, and not those that flourish above, the surface of the earth—*e.g.*, potatoes. Many regicides and political offenders are known to have been infected with a strong hereditary taint, and to have been ill-balanced, eccentric, vain, believing they were to reform the world and liberate mankind from the tyranny of sin and misery. The truth is, they were delinquents who inflicted numberless sorrows on honest, industrious citizens. Such was Passannante (studied by Virgil), Luccheni, Caporali (studied by me), Ravachol, and many other fanatics, monoideists, and sanguinary individuals (Lombroso, Ferrero, Spitzka, Forel). In their social relations they exhibit strong egoism, which is always a part of these unbalanced natures. In business they end in ruin, in their families they are incapable of preserving order or of training and educating their children. They are theorists, Utopians who, sometimes having superior intellectual qualities, beguile the public, who appraise their intellectual value from outward appearances alone. Men of strong talent are sometimes eccentric as the result of distraction. In their self-absorption they appear to forget the most elementary expediencies. A notable instance is that of a statesman who arrived at Court one evening wearing a jacket, and it was only at the door that the attendants drew his attention to the impropriety of that dress under the circumstances.

Eccentric individuals owe their natures to heredity. Even when originality may be attributed to meningeal affections suffered

in infancy, hereditary predisposition has, as a rule, played a part. More rarely does it take origin from infective diseases during pregnancy, from difficult parturition, injuries to the head, or diseases of infancy.

These natures are capable of little modification.

The majority are but slightly, if at all, harmful ; many, indeed, are efficacious in their social relations. We do not concern ourselves with the therapy of these states, of which we have made a brief review with the sole object of recognising all the forms that defects of evolution or, according to others, degenerations may assume.

CHAPTER V

DELINQUENCY

As we have seen in the second part of this work, the mind follows a twofold direction in its development—viz., knowing and feeling. By means of knowledge the intellect is evolved, by way of feeling we have development of the consciousness of the individual in his social relations. The consciousness of an individual, well developed in his social relations, is penetrated and pervaded by the emotions of his fellow-beings. This penetration or fusion of the emotions of similar beings, or even of all living beings capable of emotions, is progressive, but not always proportionate to the evolution of the intellect, and leads essentially to the formation of a collective consciousness in the individual, and this at bottom gives morality (*vide* Part II., Chapter V.).

The less the evolution of the collective consciousness, the more the individual instincts impress their own directive upon the conduct.

The instinctive nature, wrote Despine, exercises a considerably greater influence on the human actions than does the intellectual nature. Absence or defect of the moral sentiment gives rise to action that is out of harmony with the collective tendencies, and harmful to others, and the individual embodying this state is an antisocial being, a source of danger to the community to which he belongs. Such a person we call delinquent or criminal.

We may verify several hypotheses :

1. The moral sentiment is absent or but slightly developed, while the intellect is also very poor. In this case the phenomenon comes under the study of the phrenasthenias.

2. The moral sentiment is absent, and the intellect so far developed as to reach, or even rise above, the lower limits of the mean normal individual. In this case we have congenital delinquency and delinquency from acquired habits, the prototype being the born criminal or delinquent.

3. The moral sentiment is developed, and contributes to the directive of life under ordinary conditions, but has feeble powers

of resistance when the mind is crossed by an emotional current. Here we have occasional and passional delinquents.

4. The moral sentiment is more or less developed, but becomes perverted or destroyed by a mental disorder, epilepsy, or alcoholism, the mental affection giving new factors in the determination of the conduct or action of the individual in his intercourse with others. Here we have criminal insanity, or, if you like, moral insanity.

This classification, which I have taught my students since 1886, is derived from the objective examination of the facts, and, with slight variations, is the same as that of the majority of anthropological criminologists, from Ferri to Ingenieros and Kowalewski, who, after all, have departed but little from the lines traced by Lombroso. Ferri classifies delinquents in five groups: (1) *Born delinquents*, who have a congenital tendency towards crime; (2) *insane delinquents*, who are comprised in our fourth group; (3) *delinquents from acquired habit*, the criminality in this case being derived from their organization and social conditions (these, owing to their strong resemblance to born delinquents, should be classified with them in a single group, which is second in my classification); (4) *occasional delinquents*; (5) *passional delinquents*. There is no reason why these last two groups should be separately classified. The individuals composing them are all emotional, impulsive, neurasthenic, or intoxicated with alcohol (*vide* Lombroso, the various editions of his *Uomo Delinquente*; Ferri, *Studii sulla Criminalità ed altri saggi*, 1901; the *Proceedings of the Congrès d'Anthropologie criminelle de Genève*). In a recent lucid as well as comprehensive publication on this subject (*Dos paginas de Psiquiatria criminal*, Buenos Ayres, 1900), Ingenieros classifies delinquents in three groups:

1. Individuals given to crime through an anomaly in the moral sphere, congenital (born delinquents or morally insane) or acquired (delinquents from habit).

2. Individuals given to crime through an anomaly in the intellectual sphere, congenital (delinquents through congenital insanity) or acquired (delinquents through toxic insanity, political obsession, etc.).

3. Individuals prone to crime through an anomaly in the volitional sphere, congenital (congenital impulsive delinquents) or acquired (occasional delinquents).

To these groups Penta would like to add a fourth, that of the *primitives*. Such would be the ancient types that have undergone no modification, and repeat themselves in the country from generation to generation, with the same anthropological and psychological characteristics as the aboriginal savages. These come under our second group, which I hold to include many individuals with primitive characteristics. The primitive nature is met with throughout the same social class as furnishes the majority of born delinquents.

In the latter we find, in many regions, a true delay in evolution (*vide* Bianchi and Lombroso, *Misdea*, Naples, 1884).

More or less commendable reasons might be adduced in favour of one or other of the classifications, but it is undesirable to discuss them here. I would only note that defect of the moral sentiment in the delinquents of the second group in my classification may have a double origin, thus giving rise to a natural division into two subgroups. In one the evolutionary defect is developmental, depending on anomalous cerebral structure through weakness, degeneration, mental disorder, or alcoholism in the parents. This subgroup is composed of born criminals, properly so called. In the other subgroup heredity plays no part, or at least not a prominent one. The evolutive potentiality of the social animal is present, but from infancy favourable individual and environmental conditions and circumstances are absent; mal-nutrition, disease, prostitution and alcoholism of the parents, bad example, evil company, etc., are present, to the exclusion of the conditions requisite for a regular mental development. This group comprises the so-called delinquents from acquired habit.

The psychology of the former differs in no way from that of the latter. Anthropological degenerative signs are more frequent in born criminals than in criminals from acquired habit, who are also capable of greater modification; but, in all its manifestations, the life of the one resembles that of the other group in every point.

In this chapter we need not occupy ourselves with either the first or the fourth group. We have already alluded to the criminality of phrenastheniacs when treating of such.

We are already acquainted with the mechanism and dynamism of criminality in imbeciles. Given the absolute dominion of the egoistic sentiments in imbeciles, their criminality depends upon the intensity of their desires and on the degree of development of their instincts and emotions. Since there exist phrenastheniacs with the sexual instinct absent or feeble, we will not expect of them offences against chastity, just as timid or fearful imbeciles will not be the protagonists in bloody crimes, even when they have thoughts of avenging themselves for some injury, real or imaginary. There is the irascible and impatient imbecile; there is the feline, the indolent, and the cowardly imbecile; the imbecile who indulges in shocking dissipation, and the imbecile sordidly avaricious; there is the lazy vagabond, the thief, and the aggressive character. Now, it is evident that, given great differences in the minds of phrenastheniacs, the latter may or may not be delinquents. Their crimes will have quite a different origin, and the mechanism will be different in different cases, though always bearing the stamp of mental weakness, as we have already seen.

The imbecility reveals itself in the means and methods they employ to attain their ends, and in their utter want of foresight,



showing clearly a great lack of appreciation (imagination, memory) of the more or less remote consequences of a given action. One noteworthy example, among many, is that reported by Sanna Salaris :

The case is that of a young man, of twenty-two years, who had stolen seven gold rings, which he took from the fingers of the statue of the Madonna in the parish church. When arrested, he confessed his crime, but excused himself by accusing another person as being the instigator of the deed. It was clearly proved, however, that the latter had had no relation whatever with the culprit. This same young imbecile arrived home one day, riding at a great speed a horse that had been entrusted to his care by a stranger. On another occasion he stole a watch from a magistrate, and gave it to his own mother, telling her he received it as a gift from the magistrate's wife, and asking her to buy him a horse with it. Another time he stole a watch and chain from the brigadier of the Custom-House Guards, and then paraded the streets showing off the chain, which was hanging from his vest. Great deficiency of attention and foresight is very evident in all the crimes he committed, although a certain degree of improvidence is discernible in all criminals.

The delinquent of the second group presents notable physical, physiological, and psychic features. To Lombroso and his school, as well as to the majority of Italian psychiatrists, belong the credit of having methodically studied, collected, and classified these, so that few now have any doubt of their semeiological value as an expression of defective and anomalous evolution of the central nervous system, reflecting itself especially in the conduct.

Here certain brief considerations may be mentioned with advantage. We know that the same anomalies are met with, as we saw at the outset, in the delinquents of the first and fourth groups, and we can add that they may be found, without any special psychological significance, in all the beings classified in this first great group wherein we have brought together all the defects of mental evolution.

It is well, however, to come to an understanding upon, and to express in the clearest possible manner our real notion of, this question. Observation has shown that many delinquents do not present the anthropological anomalies that characterize the majority of them ; on the other hand, many men who do present those anthropological features are not delinquents. We can agree with what has been confirmed repeatedly since Sergi had occasion to express his ideas on the matter, ideas confirmed by the observations, first of Benedikt and then of others—viz., that the anomalies which do not reveal themselves in the conformation of the body may be found in the cerebral mantle (convolutions and sulci) ; on the other hand, it may be asserted that those who present degenerative anthropological signs, even when not actual delinquents, possess the delinquent mind in a state of latency. This hypothesis is related to another—viz., that where neither degenera-

tive anthropological signs nor apparent anomalies in the conformation of the brain are to be found anomalies may exist in its intimate structure. Indeed, it is in these last anomalies that we must recognise the true anatomical substratum of the anomalous conduct. There is the other fact, however, that in many cases presenting features of anthropological degeneration there is no corresponding form of delinquency. As regards latency of criminality, I believe it exists in the majority of men in the period of youth. The egoistic and antisocial tendencies remain atrophic as compared with the enormous development of the sentiments of human solidarity among evolved and educated men, and an attempt to trace the dividing-line where physiological latency ends and morbid latency begins presents insurmountable difficulties. In this matter there is never complete agreement amongst even the most convinced upholders of the anthropological type of the delinquent.

There are two factors in the conduct—heredity and environment in the widest sense. Psychopathic heredity in most instances betrays itself, under the most varied forms and in the most diverse directions of the mental activity, in *dissolution* (here I am pleased to make use of an old term introduced into our nomenclature by H. Jackson), which signifies a breaking up of the mental organism, considered in the historical moment, with loss of the most recent products of evolution—regulative capacities in the fields of thought and sentiment—resulting in immorality and simpler reflexes traversing smaller circuits, and a proportionate overpowerful impulsiveness of the individual in his interhuman relations.

The environment exercises, by the law of imitation, a continual suggestivity on the mental constitution of children and young men. In the creation of ideas by means of example, in the arousing of desires and tendencies, the determination of impulses, in the opening of new currents of emotions, collective and beneficent—in all these lies the potency of the environment. Now, if we possess the proof that the anthropologically degenerate types, placed or reared in normal educative surroundings, exhibit weaker and more governable criminal tendencies, we must conclude that anthropological degeneration and delinquency are not two synonymous terms, but are two concomitant associated facts which may remain isolated and distinct from one another.

I certainly cannot wholly agree with Colajanni, who, in his magnificent work (*La Sociologia Criminale*, 1887) maintained with a great wealth of arguments that delinquency was a special product of unfavourable circumstances, especially of misery. Psychopathic heredity has an influence quite as harmful and certainly more fatal, but I do not feel warranted by the facts in renouncing my strong conviction concerning the possible diminution of the tendency to crime, even when the psycho-anthropological structure from which we infer its existence be such as to leave no doubt as

regards the high degree of moral insufficiency. I hold that the man who is a candidate for delinquency is capable of modification when placed for a time under conditions favourable to moral development. The assertions to the contrary have arisen from the fact that scarcely any State possesses institutions perfected and designed for the education of this particular group of deficient. The reformatories and the houses of correction are, with a few happy exceptions, schools of delinquency more than anything else. Unmodified and unmodifiable types of delinquents do not exist, in an absolute sense, except in so far as the environment in which the candidate for criminality lives and develops remains unaltered. There are few exceptions to this law, and these, if closely examined, will be found to belong to criminality of the fourth group; they comprise cases of true epileptics or paranoiacs, with whom the born criminal has many points in common and many analogous features (Lombroso), but these must not be confounded.

The fact that, in the highest classes of society, degeneration manifests itself in another form, is another proof in support of our argument. Among the wealthy the primitive form of delinquency is much rarer: theft, homicide, rebellion against the public authority, are much less frequent; the degeneration betrays itself in conduct harmful to the individual himself—in the squandering of his own means, in idleness and vagabondage, in games of chance and sexual orgies, sometimes in alcoholism, and, at the very worst, in swindling; as a rule, they refrain from theft and the shedding of blood.

There is no such thing, then, as an anthropological type of delinquent; in other words, given an anomalous anthropological structure, with those signs happily defined by Lombroso and afterwards by other Italians and foreigners, it does not always follow that actual delinquency, much less a determinate form of it, is associated therewith. All the inquiries into, and statistics dealing with, this matter (and these are now fairly abundant) permit the conclusion that the so-called anthropological, and perhaps also the functional anomalies, are more frequently met with in delinquents than in normal individuals—that is to say, they give the hypothetical presumption of a latent disposition towards criminality. The very fact, however, that the same anthropological features are met with in a conspicuous number of persons living in perfect harmony with the social laws in the common environment, deprives them of the character of specificity. Favourable social conditions, along with a period of rational education and comfortable circumstances, favour the development of the moral sense to a degree sufficient to enable the individual to adapt himself to his surroundings. This proposition is amply demonstrated by the fact that the conduct of those *degenerates* who have been educated in well-conducted houses of correction, although suffering from grave hereditary blemishes, is often beyond reproach.

Children and youths, almost all candidates for delinquency, entrusted to the maternal house of the Ravaschieri in Naples; those educated in the asylum connected with the Sanctuary of Pompeii, all children of delinquents; and those referred to in the report of Dr. Lojacono* on the young misdemeanants examined in the hospice of S. Martino in Palermo (*Proceedings of the Congress of Italian Phreniatrists in Ancona*), amply demonstrate to what extent education is able to alter the mental dispositions, in spite of the degenerative forms, which, as everyone understands, undergo no modification.

Delinquency, then, is not inevitably and indissolubly bound up with the degenerative forms; its development is undoubtedly favoured by certain social conditions which supply the most stimulating food-material for the more or less active growth of the transmitted seeds of delinquency.

From a psychological point of view, immorality and delinquency have always the same value, no matter what the vestments they assume in the manifold directions in which the social life manifests itself.

In a chapter on delinquency I cannot refrain from touching upon one form of it that is altogether modern.

There is the brigand, the city thief, the merchant who, trading on the good faith of others, cleverly prepares a bankruptcy; there is the bandit who asks a proprietor to pay a ransom, holding hostage a member of his family, a herd of cattle, or the crops in the fields, which he might destroy with fire; there is the blackmailer who, having obtained possession of a family secret, extorts sums of money, holding in hostage the good name of the family; there is the usurer who speculates upon poverty, and the functionary who, exercising favouritism, hides his fault under a cloak of irresponsibility; there is the public official who embezzles the funds entrusted to him, and the executor who, through favouritism and for personal ends, spoils the future of a more meritorious candidate. Every man who fills a public office, but fails to fulfil his duty, or who abuses, for selfish ends, the privileges he enjoys, to the more or less grave injury of others, is immoral and delinquent. We have been accustomed to consider only the primitive form of delinquency in its relations with criminal anthropology, but the field of inquiry must be widened. This second form of delinquency, in its social and psychological relations, is as important as the

* *Atti del Congresso dei freniatri italiani in Ancona*. This report deals with 400 children, many of them the children of insane parents and of the worst Sicilian criminals, whose psychic development Dr. Lojacono, by my advice, has been able to follow since 1889, having succeeded in keeping them in sight, under the most diverse circumstances, after their discharge from the training-school, which in its organization is one of the best in Italy. All of them were trained to work; they all derived an honest living amidst the difficulties of the environment.

other. What has the anthropological criminologist said with regard to it ?

If the smallest thing is said, written, or done reflecting upon the honour of a conscientious individual who is exceedingly jealous of his honourable reputation, the injury he suffers is much greater than that experienced by another individual wounded by the knife of an assailant ; the bestowal of a post which has been denied a more meritorious candidate does much greater harm than an act of theft or plunder. Whilst society and the law severely punish the assailant and the thief, they deal much more leniently with the crafty, astute slanderer and with the distributor of favours, if, indeed, they do not increase his importance.

The truth is that immorality is much more extensive, and tends to extend its dominions in proportion as the sphere of human activities and the social relations of the individuals become larger ; delinquency is tending to transform itself from the primitive to a polished form : we might say that it is becoming modernized. With regard, however, to this modernized form, we do not yet possess anthropological and psychological studies, nor sufficient laws. Nevertheless, the problem is to be regarded under the purely psychological and psychopathological aspect. All we have said, then, of delinquency refers to the primitive form of it, which differs from the other in the simplicity of means and methods, as well as in the frequent impulsiveness and ferocity. Such delinquency as this closely resembles that of savages and primitive peoples. The egoism of modernized delinquency is better served by the intellect of the actor and the ignorance of the sufferer ; its modern vestments render it less evident and less demonstrable ; the danger it produces is, to all appearance, less appreciable ; its gloves and dress-coat secure it a pleasant reception even in elegant drawing-rooms and in public offices.

We may, notwithstanding, suppose that this more modern form of delinquency is also a sign of defective cerebral evolution, and up to a certain point it is favoured by a defective education and by the ever-increasing difficulties and hardships of life.

It is certainly one proof of weakness, for it allows to human action smaller circuits and less resistance, as compared with the resistance the environment opposes to efficacious labour. Here, however, we cannot discuss in detail this form of delinquency, for it takes us outside the actual limits of psychiatry and into the full domain of sociology. Having indicated these new extensions that are offered to criminal anthropology, we may at once declare that it is our intention to occupy ourselves only with the primitive form of delinquency, which permits a clearer perception of physical as well as functional and psychic signs arising through defective and anomalous cerebral development. These signs are met with in varying proportions in all the four groups, but to a greater extent

in the first, second, and fourth than in the third, as may readily be understood. Of the first group we have already spoken in the preceding chapter on the phrenasthenias; of the fourth and the third we shall speak subsequently in the chapters dealing with hysteria, epilepsy, paranoia, neurasthenia, etc. Here we shall limit ourselves to a brief review of the second.

Symptomatology of the Criminal, including the Born Criminal and Criminal from Acquired Habit.—Three groups of symptoms are to be distinguished—the morphological, the functional, and the psychological.

The anthropological signs in the criminal are the same as those I have already mentioned in the first chapter of this part—the predominance of the face over the cranium with respect to the physiological type, the large size of the jaws, the bulkiness of the muscles of mastication, the structure of the forehead (in most instances narrow, low, and receding), plagiocephaly and plagioprosopia, orbital apophyses large and projecting, the occiput flat, the canine teeth very long, etc., are those most frequently met with. Black hair (Lombroso, Marro, Thomson) more commonly than fair, greater simplicity of the palmar furrows (Carrara), asymmetry of the upper limbs, formation of a membrane between the toes resembling the membrane of some web-footed animals, macrodactylism, polydactylism, prehensile foot (Penta, '*Di alcune piu importanti anomalie e del loro significato reversivo nelle mani e nei piedi dei delinquenti.*' *Annali di Neurologia*, 1894), median occipital depression (Lombroso), anomalies of the sulci and convolutions (Benedikt, Raggi, and others), are the principal facts reflecting the anomalies of form which congenital delinquency bears in common with epilepsy, imbecility, and the other grave forms of degeneration, and in common also with the other forms of that inferior life which assumes a degeneration that is not criminal. It is evident, then, that while in the anthropological type of delinquent there are wanting specific characteristics, notes of recognition, there certainly exists a degenerative type, the anthropological signs of which coincide fairly frequently with delinquency, yet are not specific of it.

Let us now see what are the functional anomalies that Lombroso and some of his pupils have met with in the born delinquents.

The expression of the physiognomy is more readily perceived by intuition than by examination in detail. Rather small stature, low and receding forehead, black and woolly hair, oblique eyes with sinister and cynical look, often deeply set under protruding and large supraciliary arches, lop ears, flat or deviated nose, long and large face, thin lips, large jaw-bones, pale and sometimes beardless face, are the principal features of the physiognomy of the born criminal, and also of the criminal from habit.

Even functional anomalies are common to degenerates in general

and to the primitive persons we find here and there in our provinces. The diminution of tactile fineness, as is apparent in comparison with the polished man of the city, is the same as we meet with in our peasants, who, illiterate, uncultured, but sufficiently intelligent, have never been far from the village or the ground they cultivate. Be they primitive or degenerate, the majority of delinquents exhibit a defect of sensibility. Lombroso, Ottolenghi, Roncoroni, and Angiolella are agreed on this point, and bring forward in support of it many personal observations on the delinquents confined in the Sales asylum. A like defect in painful sensibility is present. Criminals are almost all hypoalgesic.

That hypoalgesia may be the basis of cruelty, as Lombroso has maintained, is more than probable ; many, however, have observed in criminals a great dread of pain, which they bear badly (Jolly, Naecke, Baer, *Der Verbrecher in antropologischer Beziehung*, 1893). The fact remains, however, that, be it from boldness or otherwise, many delinquents do not utter a single groan during painful operations ; some mutilate themselves ; many tattoo themselves, and this is known to be a painful procedure. Kowalewski tells of criminals who received a most extraordinary number of lashes with the whip, and yet bore this very savage punishment without emitting a cry. They restrain from moaning, even to the point of fainting. The absence of vocal expressions of pain is no sure sign of hypoalgesia ; proof of it, however, is found in the algometric researches with the sledge of Dubois-Raymond or other algometers (Roncoroni).

Deep muscular sensibility is normal. Criminals show precision in delicate movements, as in picking pockets, or in attacking a victim with a razor, cutting his face, as a rule, in the middle part of the cheek.

Sight is keen, though Daltonism is frequent, and the visual field often restricted, as in epilepsy and hysteria (Ottolenghi and others). Smell is highly developed in some cases, but for certain odours only ; it often happens that they do not recognise or differentiate the delicate odours of the aromatic series. Defects and anomalies of the sense of taste are also frequent as regards both fundamental and aromatic tastes. The muscular force, when voluntarily directed, as in the examination with the dynamometer, is relatively poor. In some cases, however, it is much above the average. One of the delinquents confined in the Sales asylum used to lift two hundred-weights with marvellous ease (he was a Customs House porter) ; another, for many months in Sales, had killed a man by a blow with his fist ; he possessed herculean strength. The adroitness and instantaneousness of movement of these subjects under the influence of emotional states and their torpor and slowness under ordinary conditions are remarkable (passionate emotivity, or emotivity associated with personal interests). It is no rare thing to meet with left-handedness or with ambidexterity (Lombroso), due partly

to an evolutionary and educational defect (as amongst rural people who have not learned to write), and partly, in my opinion, to diseases of infancy, (trauma, meningitis, meningeal thickening from intoxication, with predominance of action on one hemisphere). In some cases, in reconstructing the history, we make out the existence of convulsions (eclampsia) during infancy, most frequently on the right side. This fact may explain the functional defect of the musculature on the right side (retarded evolution of the left hemisphere).

Psychology of the Delinquent.—The anomalous mental development of this class of antisocial men manifests itself from childhood. Restlessness, violent reaction against members of the family and against companions, a certain threatening attitude when they are unable to attain an end or are prevented from satisfying their proper wishes, want of reason and lack of moderation in their desires, the pretexts they bring forward in opposition to all good advice and the authority of their parents, quick temper and irascibility—these are all frequent facts. Intolerance of the checks put upon them and of the discipline observed in their families, thus leading them often to run away from home and give themselves up to vagabondage; the mean tricks they play on their teachers, their relatives, and friends; obstinacy, petulance growing by degrees into violence; cruelty to animals (gouging out their eyes, plucking the feathers of birds one by one, skinning alive a pet dog, and laughing loudly the while, deriving pleasure from its cries of pain, etc.)—these are the principal features foretelling an anomalous development of the affective life.

A school companion of my earliest childhood—who when grown up was brimful of goodness—used to amuse himself by throwing barley from a window of the house into the court, where hens and chickens were running about, and when they were gathered together would throw down some large stones that he had collected beforehand, in order to procure the great pleasure of seeing one or more of them in agony; the offence was aggravated by the fact that the chickens did not belong to his family.

Such children being incapable of fixing their attention on the lessons in school, make themselves conspicuous by their continual absences, preferring vagabondage and association with gangs of the most brazen-faced and debased characters, with whom they pass hours on end, playing cards and other games. There is complete absence of a sense of shame for the sorry figure they cut at school, and they excuse their conduct with vulgar lies; they are never animated by any feeling of emulation in their work: in most instances they assume a threatening and aggressive attitude towards the teacher when he makes any complaints, and among their companions they assume an air of cynical bravado for the

agreeable hours they have passed in amusement. If perchance they are irritated by their companions or teachers, they stand up for their rights with violence. At home they are undisciplined: they refuse to go regularly to school, to the office, or to their work; they are late in retiring at night; they ill-treat their own brothers and sisters, and in the superabundance of their egoism show complete absence of affection for their parents, to whom they cause all manner of pain.

Meanwhile the sexual instinct breaks forth in all its potency, with its train of attendants, assuming the supreme sway in the vital sphere. In some instances this sexual ascendancy occurs very early. Such inferior beings abandon themselves without restraint to onanism, or even as children make animal attempts at copulation (a restless and violent neuropathic child of little more than three years attempted several times to give vent to his lascivious desires by seizing hold of the leg of his young aunt). They seek out women of evil life, associate with the most depraved and dangerous beings, and become enamoured of women who, again, are protected by men of evil life, to whom they are a source of income. Such is the nature of their environment, to which they dedicate all the perversity of their minds. At this point we must make a distinction between adolescents belonging to the aristocracy and the well-to-do citizens and those of the working and common classes. The former are continually obtaining money from their families by all sorts of violence, steal everything within their reach, obtain false keys of their parents' cash-box, even menace their fathers or mothers with weapons, or, threatening to commit suicide, yell and shout like persons possessed until they are given the whole or part of the desired sum which is to serve for their debaucheries with their women and the associates of the latter, in whose hands the young delinquent is now a mere tool; or, if his family is rich and he is to inherit a fortune, he will sign bills of exchange which are five or ten times the value of the money received. Sometimes such degenerates will forge the signatures of their fathers or mothers; and so, in their revelry and the delirium of their senses, they squander their fortunes and those of their families without regret; they compromise their liberty without giving it a thought; they are without chastity, without repentance, without sorrow, and without pity for their poor parents, whom they hate, and whose death they desire. The most barefaced cynicism, the most complete and profound moral anæsthesia, the most serene ignorance of their social duties, their future, and the misery threatening them, are amongst their characteristics; or even if they recognise the danger, like an inevitable fatality overhanging them and swaying their destinies, they give no sign of active repentance or awakening of good desires. Stupefied by enjoyment and by the environment, they reach that extreme limit of economic potentiality, where await them the con-

tempt and the ill-treatment of those very beings who have drained their last drop of blood and destroyed any germ they may have possessed of the sentiment of honour.

Those belonging to the lowest social strata at an early age give themselves up to an evil life, associate with professional thieves and assassins, and pursue their career, passing through the different grades of delinquency, according to their dexterity and audacity and their ferocity in aggressions. If sent to an ordinary house of correction they show themselves more apt pupils in perversity than in improving themselves and learning to work. They are always cynical and extraordinarily cruel, especially in youth. Dril (*La criminalité et les criminels*, 1895) refers to a youth of sixteen years whose lascivious desires were greatly excited by the mistress of a workman who had adopted him and brought him up. This woman fell ill, and during her illness was killed and ravished by that youth, who afterwards recounted the story of his crime with horrible cynicism: 'When I happened to touch her skin I was overwhelmed by the desire to possess her, and feeling myself greatly excited at the sight of her superb neck, said to myself: "I shall have her, dead or alive!"' As, however, I thought I would not be able to obtain her consent, the idea came into my head to kill her and then satisfy my desires to the full; it would be so nice whilst the body was yet warm!'

At seventeen years of age Caruson, according to a prearranged plan, cut the throat of an old lady who had been good to him. In the presence of the reeking body he made a search for, and took possession of, everything of value she possessed, then coolly went away as if he had done nothing at all serious. In prison or without, such individuals seek the company of adults hardened to a life of crime, and become enchanted with the new and grotesque horizons opened out before them; they become fanatical in their hope or determination to give a sudden proof of their valour, their courage, their audacity. They are full of aspirations to reach the highest grades of their society; the last feeble remains of their repugnance for crime, if ever it existed, is swept away; in crime is their very existence, love, honour, vanity, and joy; the pleasure they find in a society inimical to the generality of men, whom they cause all sorts of annoyance and unforeseen danger, is the end of their existence. Some nourish a deadly hatred for their parents, especially if the latter make efforts to restrain them from their perverse tendencies; others, who either have no homes or have no homes to which they can go, have a hatred for the city police, who represent the only obstacle to their evil designs. If warned, they strongly resent being shadowed and watched by the police, against whom they cherish ideas of revenge, which explode with an extraordinary violence on an attempt at arrest. The outburst of fury is then terrific, with its mingled threats and abuses, so that it requires

three or four to apply the handcuffs. This state of affairs sometimes continues even in the police cell, and, wrongly interpreted by the authorities and the police surgeon, leads to the offender being sent to the asylum instead of to the prison. Immediately they come into the asylum a state of calm supervenes. On two occasions when warders arrived at the asylum to transfer a delinquent of this class to the police cell or to prison, the very sight of them was sufficient to immediately excite in the offenders a state of fury, accompanied by obscene language, yelling, kicking, and struggling, so that it became necessary to detain them longer in the asylum in order to persuade them to exercise some self-restraint in their own interests.

They are addicted to the use of wine, which they tolerate badly. Small quantities of wine or any alcoholic liquor have an extraordinary influence in exciting them to crime (Lombroso). Misdea, the soldier Radice, Caruson, and many other born or habitual criminals, committed their crimes under the influence of drink.

They have a tendency to league themselves together in gangs—*e.g.*, the ‘Camorra,’ the ‘Maffia,’ and the ‘Teppia’; the same thing happens in the asylum unless they are kept under close observation and isolated from one another. They have common interests, means, and methods, and feel the need of reciprocity of protection. The individual members of a clique never abandon one another; when taken into custody their companions often provide for their better treatment in prison and for the wants of their families; they are very obedient to the statutes and regulations of the particular society to which they belong. This holds good everywhere. What I have noted has been observed also by Dostojewski, Orfanoff, Jandrintzeff. No virtue has any value in their eyes; they recognise, esteem, and appreciate nothing but brute force.

They are a society apart, and take a pride in their force and potency in crime.

Strong or not, they are pervaded by a great vanity, which is a real weakness (Lombroso). Everyone remembers the morbid vanity of Musolino, who was less concerned about his ultimate fate than about what the Italian journals said of him. He was exceedingly courteous, especially with the correspondents of the journals, and it was to them he most frequently turned when from the dock he replied to the President of the Court of Assize.

The sentiment of remorse is entirely absent. They lie in the most barefaced manner; they almost invariably pose as the victims of injustice and persecution; when they have committed murders they even feel that they were justified in doing so. No matter what their nationality, these delinquents one and all present the same traits. Dostojewski says: ‘During the long years of my detention, I never once observed in the convicts the least sign of repentance or of regret for the crimes committed.’

Impulsiveness is another characteristic of this group of delinquents. A slight opposition is sufficient to excite them to reaction ; then they burst out, making ferocious attacks. Others curb their anger, and make a cowardly attack on their enemies when their backs are turned. Good dissimulators, they sometimes know how to wait for the opportune moment, so as to insure success in carrying out their evil projects.

They are emotional to an extraordinary degree. I reproduce here some tracings taken on Musolino with the gauntlet of Patrizi (Figs. 71 to 75).

They are cruel to their lovers, whom they beat, even slashing their faces with razors. From time to time, almost periodically, this impulsive tendency breaks forth, and is a truly morbid, emotive superexcitability, almost maniacal and accessional. This feature, common amongst Italian criminals, has also been observed by Dostojewski, as mentioned by Kowalewski. According to him, there exists a type of delinquent ordinarily very quiet and calm. Such a one supports the bitterness of his lot without the least complaint, only to burst out some day or other ; then, the time being ripe, without a moment's warning, he strikes down his oppressor. Having once killed his enemy—and he understands the nature of his act, since he sees the need of an apparent pretext—the same convict continues his murderous assaults. He does not confine himself to his enemies, but kills the first person he meets, kills for amusement, because of a word of doubtful meaning, a look on which he puts a bad interpretation, etc. It is impossible to foresee such an explosion, which in prison is sometimes of a collective nature, and presents the same characteristics in all countries.

In ordinary asylums, such as that of Naples, where there does not exist a special department for them, they maltreat the poor mental weaklings, striking terror into their hearts, and even depriving them of any extra they receive from their relatives—*e.g.*, tobacco or money. Some of them have taken really indefatigable interest in many of the patients, without any thought of direct profit ; but it is only to secure the goodwill of the superintendent or the physicians, and to obtain greater advantages through them, and finally their freedom, as soon as they deem it opportune to return to their ordinary life, only to resume with eagerness and delight their criminal adventures.

Many have true periods of calm, in which they are fairly well disciplined and respectful. After a certain time, however, the mania for crime returns with overpowering and determinative strength, with a periodicity that resembles that of other instincts. Some of them not only kill but torture their victims.

They are often religious and given to flattery, but, like epileptics, they pass from flattery to cruel violence at a moment's notice, either in reaction against a real or supposed injury or to attain

some hidden end. All the criminals confined in my asylum have, before me and the medical officers, exhibited marked subjection ;

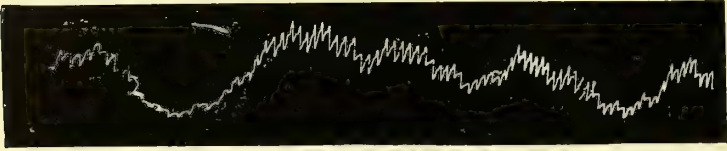


FIG. 71.—ACCUSED OF THEFT. ACQUITTAL.

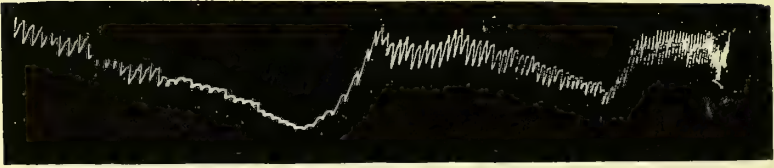


FIG. 72.—WHEN MUSOLINO REMEMBERED HIS ENEMY ZOCCOLI.

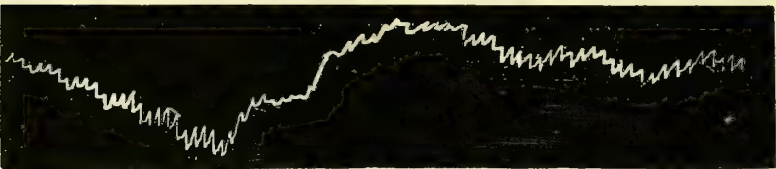


FIG. 73.—WHEN MUSOLINO REMEMBERED HIS SWEETHEART.

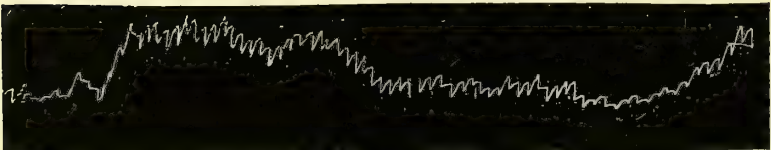


FIG. 74.—WHEN MUSOLINO REMEMBERED HIS SISTER.



FIG. 75.—WHEN HE WAS AGAIN REMINDED OF HIS ENEMIES.

to me they have shown humility for the simple reason that from me they have obtained some concession, and hope to get their liberty as soon as they are tired of asylum life and begin to make

entreaties to be discharged as recovered. As, however, from time to time, I declare those who are not insane (belonging to Group IV.) to be responsible to the judicial authorities, when they see that they are condemned on the strength of my report, they seek to intimidate me in order to escape punishment and the special vigilance of the police. The simulation of insanity or of epilepsy is one of the most striking features in Neapolitan criminals. In Italian tribunals, owing to the exaggeration, from a professional point of view, of the bearing of the doctrines of the Italian anthropological school, a certain number of criminals have been liberated in consideration of the morbid origin of the crime, as has also happened with some epileptics who have committed grave crimes. The result of all this has been that delinquents have learned, in prison and then in the asylum, to simulate epilepsy and mental confusion in a wonderfully perfect manner. One such individual brought on a convulsive attack during the clinical lecture I was delivering upon him apropos of simulation, reproducing all the classical phenomena of the epileptic attack, even cyanosis (voluntarily stopping respiration in the expiratory phase) and bloody froth in the mouth.

They are revengeful in the extreme. On one occasion one of them attacked a head attendant when his back was turned, and, with a small, sharp piece of glass, managed to inflict a long wound on his face, and this owing merely to the fact that he had rigidly carried out the orders given him with regard to the patient, whom he had kept well under control.

They are lazy and indifferent (Lombroso, Ferrero, Dostojewski, Laurent, Féré, Kowalewski, and others). They work readily on their own initiative and in accordance with their fancies, in order to attain a given end or to procure some advantage, as when they assist the nurses in looking after the patients, or in the distribution of the food, of which they always take the lion's share, or when they go to work in the garden or in the kitchen, sometimes to meet someone whom they can domineer, at other times to procure a weapon—a piece of glass, a nail, or a splinter of wood—with which to attack a chosen enemy. All of them have ever the greatest repugnance to an arranged, continuous, disciplined form of labour, proportioned to their strength.

Pederasty is frequent among them, both active and passive, according to their character.

Their intelligence is almost always below the average; the perceptive power is weak, the memory unfaithful; through force of their lying habits, they confound truth with falsehood; the imagination is poor in resource.

Some of them are dreamers by nature, have the æsthetic sense somewhat more developed, and write emphatic verses; their passion and mystic verse resembles the poetry of primitive

peoples. A classic example is found in the poetry of Musolino (*La Biografia di un bandito*, Morselli and De Sanctis, 1903).

The ideative field is almost invariably restricted to that which refers to their individual interests. Astuteness takes the place of intelligence.

I here report a typical case of a born criminal.

OBSERVATION.—G. E., son of the late L. and the surviving widow A., on the 17th day of September, 1903, in the Via Paolo Emilio Imbriani, stripped himself naked, tearing his clothes into pieces and publicly exposing his genitals. He was arrested and conveyed to prison to answer a charge of indecent conduct. As this was not the first occasion on which G. had abandoned himself to similar acts, having, in point of fact, only been discharged from prison the previous day, after undergoing a sentence of forty days for the very same indecency, and as the previous history of G. showed that for over twenty years his life had been spent alternately in the prison and the asylum, the suspicion arose that this act whereby he made an exhibition of himself was not a conscious and voluntary act, but was rather to be regarded as an effect of mental disorder.

G. E., a native of Naples, age forty-three years, is of low stature, has a rather delicate complexion and somewhat feeble health, owing to chronic bronchitis, with frequent exacerbations. He presents numerous degenerative anthropological signs, of which the following are most worthy of consideration: a not very marked degree of plagiocephaly and scaphocephaly; very marked prominence of the external semi-circular line of the occipital bone; nose large and slightly deviated to the left; strongly developed lop ears; Darwin's tubercle more developed on the left side. (I omit the measurements of the cranium and the face, as they present nothing remarkable.)

He bears also numerous tattoo marks, signs of the society of which he is a member, and a record of the very many days spent in prison. On the left arm, round the figure of a revolver, is inscribed: '*With this, whilst there is life, there is hope.*' On the right arm is written: '*Long live the Republic!*' On the dorsal aspect of the left forearm are these words: '*I loved Sylvia of Constance, and she returned my love; now she is dead, I will love no more.*'

The examination of the thoracic and abdominal organs reveals no noteworthy feature apart from signs of chronic bronchitis. The physical examination of the nervous system reveals accentuation of the patellar reflexes and diminished sensibility to pain. For the rest, there is nothing abnormal.

The psychic condition of G. E. is to be gathered not so much from the actual examination as from his history, which furnishes us with such particulars that, with their guidance, it is impossible to fall into any error as regards the mental structure of our subject.

First of all, let us inquire into the nature of his family environment. His father belonged to a family in fairly good circumstances. Between 1848 and 1860 he became a member of a secret society having patriotic objects in view, and took part in some insurrectionary movement in the southern provinces. For this he was prosecuted by the Bourbon Government, and for four years was an exile in foreign lands, unable for a long time to communicate with his family. At the end of four years he unexpectedly arrived home one night, to the great surprise of his family. As it was impossible to remain concealed in a small country, where sooner or later he must inevitably be discovered, he presented himself to the Duke di S. V., a great friend of Ferdinand II., with the object of inducing

the Duke to obtain for him the King's pardon. The Duke obtained the pardon, and, afterwards, even gave him a daughter in marriage. Thereafter, L., having married a lady much richer than himself, and belonging to a higher social class, became exceedingly inflated in his manners. He left his modest residence and came to Naples to live in pomp and magnificence, and his luxurious apartments, his carriages, liveries, and insensate expenditure very soon resulted in the dissipation of the young couple's patrimony. L. had no time to change his mode of life or to experience poverty, for, having joined the patriotic conspiracies, he was killed in the reactionary movement on September 4th, 1860, leaving his young wife with a baby at the breast and soon to bear another. Our patient, G. E., was the firstborn.

The father, then, was an exalted fanatic, a spendthrift, perhaps even a scoundrel. On the death of her husband the mother of G. E. bore her misfortune with grief more apparent than real. It is inadvisable to occupy ourselves with her, except to show that the germ of delinquency was not wanting even on her side. Her second child, born after the death of her husband, remained with her almost until maturity; the first, however, from a very early age, lived almost constantly with relatives, and occasionally in his mother's house. We shall see what sort of life he led when grown up.

Such were the parents of our patient: the father ill-balanced, fanatical, and prodigal; of the moral character of the mother the son himself speaks.

The earliest years of G. E.'s life are outlined in a remarkable document in our possession. During his last detention in the provincial asylum at Naples he wrote, at our request, and in order to employ himself in the long hours of idleness, his biography—a document of more than ordinary interest, in which he reveals, with satisfaction and with absolute frankness, the earliest appearance, the gradual growth, and the immense development of his low, unrestrainable instincts in the midst of the arid desert of his mind, void of moral sentiments. It is a writing which, if we make allowance for errors in spelling, poverty of language, and dialectic constructions, features compatible with his total lack of culture, absorbs the interest of the reader who is not indifferent to the problems of psychopathology, and commands the attention from the first to the last line. Though the reader's mind be perturbed on being admitted to the hidden secrets of a perverse mind, where the criteria of ordinary life are reversed, where brute instinct reigns supreme without any contrast of criteria and of moral sentiments, yet at least it is pleased and surprised by the sincerity with which the author reveals himself. It is wonderful, indeed, to note how a man who cannot possibly have been taught by anyone to trace the genesis of ideas, sentiments, and passions, follows the gradual development of his tendency to theft, a tendency which ultimately becomes unrestrainable. I mention the headings merely of some chapters in which he deals more particularly with this tendency: 'The Little Thief—E.'s First Theft—First Arrest—First Trial—The Camorristal Society in the Cappuccinelle of Naples—Admission of No. 918 [that was his number on the register] to the Circle of *picciuotti* [young hands]—The Admonition—The House of Correction.' These headings clearly indicate the successive stations along the road to delinquency. He commences with a trivial theft at home, instigated by his companions; the theft is discovered by mere accident and reported to the police authorities by the family, whose suspicions had fallen on innocent persons. He arrives at the theft of 1,800 lire from two ladies in broad daylight on the Ponte della Sanita, accomplished entirely without aid. Thenceforward he commits innumerable petty robberies of varying magnitude, sometimes being discovered and punished, at others evading discovery. Now he is involved in some petty thefts

attempted or committed by himself alone, now he is the central figure in a society of robbers ; again, he is simply an accomplice, playing a secondary part ; his handiwork is in constant evidence ; when there is an evil deed to be done he is sure to have a hand in it.

Proceeding in an orderly fashion, however, I might first mention that as a child he was cruel and given to stealing. He himself writes : ' G. E., arrived at the age of seven years, became so cruel and ferocious that his aunt was unable to exercise any corrective influence over him, notwithstanding the punishments she inflicted upon him each time she had complaints from the mothers of other boys whom E., without any reason, habitually ill-treated, striking them or scratching their faces with his finger-nails, or even stabbing them ; at times when he could find no boys to ill-use, he would climb trees, take young birds from their nests, and, without a care for their sufferings, pluck their feathers and wring their necks, all with the greatest enjoyment. Besides these perverse qualities, which show him to have been a heartless wretch, he exhibited another, even more significant one, which compelled his aunt to keep under lock and key all linen articles, money, etc., for everything that came within his reach he stole. . . . Notwithstanding all these very bad qualities of G. E., he was greatly loved by a charming creature, who could not tear herself away from him for a single moment. She was his cousin, his aunt's daughter. Every time the aunt punished her nephew by keeping him without food, this cousin concealed the half of her dinner, conveyed it secretly to him, and consoled him with affectionate caresses. Whilst she loved her cousin, he hated her, used to strike her, and sometimes tried to violate her.'

Thus he describes the cruelty, the tendency to steal, and the precocious development of the sexual instinct, and no more faithful description could be given.

With the lapse of years these wicked tendencies, far from becoming checked, grew ever stronger. At eight years of age, when he used to sleep alone with his cousin, he embraced her and held her tightly in his grasp, and only failed to violate her because of the insufficient development of the sexual organs, but enjoyed the genital orgasm. Later on, at nine years of age, he stole some money from his aunt's house and went with some companions to a neighbouring country fair, where he had a true copulation with a woman connected with the show. A few days afterwards he noticed that he had been infected with blenorrhœa. A year or so later, having returned to his mother's house, he violated his brother, a boy of seven years. He next devoted his attentions to prostitutes, one of whom, at one time a singer in the Teatro delle Follie Drammatiche, made him her lover, providing him with food and drink and giving him pocket-money for his vices. Thenceforward he showed no further homosexual tendencies, and had recourse to sodomy only in prison, in the absence of women.

At the age of eleven or twelve years, having been sent to the house of correction of the Cappuccinelle, he was thrown into contact with the organized ' Società Camorristale,' and was soon admitted a member. He was initiated into the rules of the society by an older companion, underwent examination, and became a *picciuotto*. Very soon he distinguished himself among the members of the society by his dexterity in theft, and was looked up to by his companions. Some years later, after a bloody crime, greatly desired and boldly executed, he was promoted to be a *camorrista*. In the criminal asylum at Aversa, in various prisons, in the house of correction in Ischia, he unfailingly found the ' organized circle ' of *picciuotti* or of *camorristi*, and joined their number ; on some occasions he has even acted as chief, when no more conspicuous person than himself was present. Outside the prison or the

asylum he always remained faithful to the oath taken before the head *picciotto* of the Cappuccinelle.

His speciality is pocket-picking. He has not involved himself to any great extent in bloody crimes. Only two persons has he persecuted with an implacable hatred, and even attempted to kill. These, he himself affirms, were his mother's lover and a certain other person who, for a small sum, acquired from his mother his paternal patrimony, which she had no right to sell. This person on one occasion only escaped his fury and his dagger by the ready intervention of some people who stepped between them. Against his mother's lover for many years he meditated revenge, having sworn on the portrait of his father to vindicate the injured honour of the family. Finally, he waited for him one morning on the Piazza Municipio and discharged a pistol at him, wounding him severely in the shoulder. The court of assize acquitted him. He has committed no other bloody crime.

To an individual who so frequently fell into the hands of the police, it was necessary to invent some means or other of eluding punishment as far as possible; and G. E. found it in the simulation of insanity. He confesses that the first occasion on which he attempted simulation was when they proposed to discharge him from the Cappuccinelle, when he feigned epileptic convulsions and insanity. His first deception having proved successful, he repeated it frequently, always with happy results. It was only a few years ago, in this provincial asylum, that the deception was discovered and denounced. The convulsion simulated by G. E. so closely resembled the real typical epileptic accession that on one occasion I made use of G. E. to demonstrate to my students how difficult, and sometimes almost impossible, it is to determine with certainty whether an accession be feigned or real. G. E. now confesses his deception with the greatest unconcern, and with the same effrontery with which he admits all his roguery.

From this analysis we can readily deduce that it is not the exact and rapid perception of things, not the power of reasoning, nor the discrimination of right from wrong, that is wanting in our subject; it is, rather, the altruistic sentiments that are defective.

The sentiment of love, which, being in immediate relation with the sexual instinct, of which it is merely an evolved stage, should thrill his mind, is almost entirely silent. As a child, in the birthplace of his family, he took advantage of the puerile affection of a little girl of his own age who was enamoured of him to derive particular favours, and in order to vent upon her the precocious instincts that were arising within him.

When, however, after a prolonged separation, she again met him, now a marriageable young man, and the old love kindled anew in her, he showed himself proof against all the innocent seductions she employed to win him to her. To one letter full of affection which that creature sent to him, he, after some expressions of regard, replied thus: 'My heart is not made to love, and I could never make you happy.' It is true, however, that he had some esteem, and perhaps even a little affection—a rare thing!—for Sylvia. 'How could I make you happy,' he wrote, 'in the career upon which I have entered—that of a *camorrista*—one which could only bring you afflictions innumerable and a sea of tears, seeing that I am sure to end my days in penal servitude or die a violent death?'

Sylvia's love for him was strong enough to redeem him had he been capable of redemption. In consequence of this ill-requited love and the rumours she heard of the crimes and misdeeds of her lover, she died of consumption at the age of twenty. The sacrifice of this lady and the consciousness that he was unworthy of her love have left a sad memory in his mind. The name of Sylvia, as we have already seen, figures in

one of the tattoo marks, with words and designs that rise above the affective capacity of our subject. Thereafter he attached himself only to women who gave him the fruits of prostitution.

He has no religious sentiment. He writes of his religion as follows: 'I never did and do not yet believe in the existence of God, for all human beings are born of chance and nature.'

We see in him only his *ego*, cruel, ruthless, irreconcilable, instinctive. The moral sentiment is not even rudimentary. He finds pleasure in causing injury to others; the sight of his fellow-beings or of animals in pain gives him a keen satisfaction; other people's property is his; he recognises no law outside that of the camorristal society. No disturbance of the intellect is discernible in him; no defect of logic is present in the ideative process, nor can we discover any quantitative or qualitative defect in the perceptive process. He is cunning, with that shrewdness that constrains the intellect to immobility (Jolly, Krause, Wey—'Physical and Intellectual Training of Criminals'). He has never suffered from any mental disorder, nor from epilepsy. Any condition of that kind that was at one time attributed to him, and that led to his being sent to the asylum and thus acquitted or found irresponsible for his crime, was always feigned. Like all born criminals and criminals from acquired habit, he obeys a permanent tendency.

Such is the picture of this criminal. The bilateral psychopathic heredity, the degenerative anthropological signs, and the hypoalgesia, are his distinguishing biological features. The psychology of G. E. gives us a general idea of the ruling features of the born criminal.

Delinquency in woman assumes diverse forms and characteristics, depending upon the structure of her mind, upon her nature and her tendencies, in a word—upon her character. Weaker in moral sentiment, more vindictive, more jealous, more vain, and at the same time less courageous, than man, she, as a rule, takes a second place as an accomplice of the male delinquent, either inciting to crime or acting as a receiver of stolen goods. She is less frequently homicidal than man, and prefers poison to a dagger; she is oftener a thief and infanticide, but is less intelligent, less wary, and has less foresight, leaving more evident traces of her work. For some time back the number of crimes committed by women with the revolver has been on the increase.

The centre of irradiation of the tendencies and actions of woman lies in her sexual life—love and jealousy. To overcome obstacles or get rid of dangers in the attainment of her ends, in the satisfaction of her instincts, and in the abandonment of her mind to her passions is, as a rule, the motive of the crimes of the female delinquent. Lascivious and fanatical, she is an incongruous mixture of love and hatred, of generosity and avarice, of sympathy and cruelty, of piety and sinfulness. More readily swayed by passion than man, she allows herself to be carried away by the impetus of her mind with rather less precaution, and in her criminal projects does not hesitate in the selection of the line of conduct by which she gives effect to her passionate state—theft, homicide, infanticide, abandonment of the family, and prostitution. The multiplicity of the crimes is the expression of her mobile and readily

decomposable nature (Lombroso and Ferrero, Tarnovski, Kowalewski). Less modest than man, but more able to simulate, she yields herself to the demands of sexuality, which easily rend the thin veil of chastity and honour, and on this account she is more prone to exhibitionism and obscenity.

The great bulk of female delinquency is manifested in prostitution. There the primitive instinct, stripped of all the vestments of the cultured mind, finds free course; there we behold the unrestrained brutality of pleasure with all its perversions; there is dealt the death-blow of all that love can give to, or receive from, the intellect and character.

The born prostitute manifests her nature and her instinctive sexual tendencies from adolescence or an early age. She yields herself without reflection to the overpowering demands of the sexual instinct. In these and other characteristics the born prostitute resembles the born delinquent (Lombroso and Ferrero).

But the born prostitute is very rare. The majority of prostitutes are made so by poverty or as the result of seduction. After the first downward step, expelled from home, obliged to leave their own district, they give themselves up to an evil life, and drown their remorse in orgies of love and debauches of alcohol; it is a kind of immoral alienation.

Such women, if placed under favourable conditions, may yet become good wives and even good mothers. I have had opportunity of following the histories of several of them whom I had under treatment in the hospital for syphilitic affections at the beginning of my career; sexual anæsthesia is frequent even in these.

Somatic signs of degeneration are less marked in woman than in man.

There are few differences with regard to functional disorders. These are often of a hysterical nature.

Ætiology.—The causes of delinquency are many; I will mention only the principal.

Psychopathic Heredity—Primitive Constitution.—They belong to races, regions, and social ranks in which the conditions for a proportionate development of the moral sentiment are unfavourable. Jealousy, hatred, suspicion, revenge, individualism, prejudice, cruelty, are their predominant mental features.

Civilization.—It is well known that the more urgent requirements of life drive to crime those weaker individuals who endeavour to procure the necessities of life with the least possible exertion. This universal phenomenon is portrayed in the most vivid colours by Zola in the character of Nanette in 'Travail.' The increase in delinquency in all civilized countries is dependent upon the complicated social relations, which demand, proportionately to the

increased desires and requirements, a higher potential of individual energy to overcome obstacles. It is clear that, if the development of the reactive energies is not proportionate to the amount of labour demanded by the exigencies of modern civilized life, there is an increase in the proportion of weaklings who cater for their existence by deviating from the lines laid down by general consent. All the more must the number of those less adapted for the performance of the functions of such complicated mechanisms increase, the less the mind is prepared for the new conditions of existence, provided there do not exist circumstances so favourable as to induce in a race a rapid evolution of the cerebral activities proportionate to the complication of the mechanisms of the social life. Without doubt the enormous increase of delinquency in many regions of modern Italy is to be attributed to a want of preparation for the forms of modern civilized life.

The progress of civilization gives not only an increase in insanity, but also, in the weaker or younger races, an increase in delinquency. The massing together of large numbers of workmen in industrial centres, with the consequent increase of the sum of desires and aspirations, alcoholism, depraved habits, and syphilis, give rise to degeneration and thus to delinquency.

Education and the press, especially the latter, by raising the individual consciousness and tending to level all social classes, offer to the poor and weak in a highly attractive form, a daily quatum of desires destined to remain unsatisfied.

Religion, the sentiment of which is every day becoming weaker with the diminishing faith in the joys of a future life that rendered the misery, griefs, and hardships of this earthly life more tolerable, plays also its part. Religion, if it is not morality, is at least a step towards true morality, for which humanity is slowly but surely preparing itself. The strong inhibitory power that religion was wont to exercise is now becoming weaker much more rapidly than the sentiment of human solidarity, and the consciousness of individual duty are developing.

Politics and Public Administration, and the vast field that the new liberties open to citizens in the management of public affairs, the passions and the interests connected therewith, give the measure of the moral weakness of a great number of individuals, and add a significant cipher to the delinquency of those countries with a free government.

Prisons exercise a great influence for evil in the matter of delinquency, by gathering together children and adolescents. In one of my speeches in the House of Deputies I had occasion to say that the prisons were a school for delinquency. Dril confirms my observation. Kowalewski asserts that in Russia, thanks to the indolence of the State, more than 10,000 adolescents are each year made depraved and prepared for a career of crime by the lessons received

in prisons. Of 140,000 imprisoned annually in France, 129,000 return to society more depraved than before (Virouboff). Twenty-two per cent. of prisoners liberated return to the Russian prisons every year.

It is beyond doubt that even the school sometimes produces criminals. In those that are greatly crowded it is sufficient for the spread of evil that there be two or three who, during the hours of recreation, make active and efficacious propaganda of their instincts and criminal tendencies, which find in youth and in adolescence a ready and fertile soil (Emminghaus, Tard).

Alcohol has a great genetic power, not only in delinquency in general, but in innate criminality. In this respect there holds good what we have already said as regards the ætiology of phrenasthenia, besides what we have yet to add with respect to the ætiology of epilepsy. Crimes due to alcohol reach an enormous figure—according to Baer, 41.5 per cent. ; according to Claude, 45 per cent. in France ; in Hungary, 35 per cent. (Feketin) ; in Switzerland, 42 per cent. (Schaffrot) ; in Sweden, 71 per cent. of men (Wiesलगren) ; in the district of St. Petersburg, 47 per cent. (Kowalewski).

Poverty is certainly one of the most potent causes of delinquency.

To be in comfortable circumstances is to be well armed against criminality. Good nutrition, satisfaction of the real requirements of life, education, and proportionate labour, are all factors facilitating the maintenance of equilibrium in the development of the brain, and the proper adaptation of the individual to the environment. Poverty, bringing in its train scanty nutrition, urgent needs that remain unsatisfied, and insufficient dwellings, where sexual contacts are easy and premature ; numerous progeny, which, as F. S. Nitti has demonstrated, is an accompaniment of misery ; hard labour in the mine, in the workshop, or in the fields, where, as in the scholastic communities, the presence of one or two badly disposed individuals is sufficient to make proselytes to criminality ; and drunkenness, in which it is sought to drown the weariness or sorrow of life for a few hours, and the prostitution resulting therefrom, are all factors that give rise to degeneration and delinquency in the descendants.

On the other hand, wealth may also supply a good contingent to degeneration, owing to the unrestrained indulgence in carnal pleasures on the part of the sons of rich parents, who have been brought up in the lap of luxury, and have had all their desires gratified indiscriminately and without opposition. Perhaps no one has described better than Zola, in his picture of the decadence of the Quirignon family, the progressive degeneration of the rich (Bianchi, *Conferenza su Zola*).

Age is not without its influence in delinquency. Youth is more favourable than maturity to criminality. Tard appears to have found an increase in the number of young and a diminution in the

number of mature homicides. In Germany the increase of 51 per cent. of the delinquents that took place in the years prior to 1898 was in great measure due, according to Hirsch, to the increased number of young criminals. The explanation is evident. Defective education, want of religious restraint (Tard), strong desire and impatience for the pleasures of life, vigour, vanity and thoughtlessness, strong sexual instinct, the weak sentiment of authority (which every day is growing weaker) in the family, the State and the Church, the morbidly exalted and hypertrophied sentiment of equality in young men in whom it arises from the sentiment of personal energy when uncorrected by a good and vigilant upbringing—all concur towards the greater frequency of criminality in the young. The child is *per se* a delinquent as compared with the adult, only the natural process of evolution and education make it a useful member of society.

Commange, physician-in-chief at Saint Lazare's at Paris, adduces in his book on prostitution astounding figures bearing upon the large number of clandestine prostitutes who have contracted syphilis before the age of eighteen.

Once criminality, or, in the wider sense, degeneration, is initiated in the family, the latter becomes a nursery of candidates for delinquency. Heredity gives the criminal disposition, and example the criminal education; poverty and alcohol remove from the consciousness of the delinquent or the degenerate any lurking good that might yet be found therein. Alcohol and insanity come under the same heading in criminal heredity. The publications of Lombroso, Penta, Virgilio, Marro, and others, exhibit in the clearest possible light the close relationship between insanity and delinquency. The born criminal inherits the disposition to crime, which may be corrected by favourable circumstances. In this regard the theory of Lombroso is very probable. I exclude the organic fatality of crime, except where the congenital disposition towards delinquency is complicated with epilepsy. I hasten, however, to declare that it is not at all just to increase the too general belief with regard to the frequency of the association of epilepsy with congenital delinquency, if we do not wish to confound epilepsy with impulsivity, very different pathological factors, because it has very frequently happened, especially since the doctrine of the Italian positive school has become popular, that in the public prosecutions, epilepsy, in either the convulsive or the psychic form, has been simulated by criminals in a marvellous manner.

It is certain that early attention to the upbringing of the children of criminals gives marvellous results, even when the presence of anthropological signs gives evidence of the organic structure of the born criminal. Hence the hereditary born criminal may develop in one of two directions: he either remains in the criminal environ-

ment, a poor, depraved creature, with the result that his innate criminality becomes reinforced, or he finds an educative environment and becomes a respectable member of society, a *corrected criminal*, or a criminaloid. In this case the biological (Bechterew), the moral, and the intellectual sides all undergo a modification; the prenatal instinct of an antisocial life is efficiently restrained by the new acquisitions from the mind of humanity; the new grafts from the great tree of life yield fruit that is acceptable to civilized humanity; or, again, he may become a modernized delinquent, very egoistic and very cunning, striving to hide under a polished exterior his primitive covetous nature and his evil designs on the possessions of others.

Whilst the psychopathic heredity gives the born delinquent, who is reinforced by the environment, the environment alone may give rise to the criminal from acquired habit, who is with great difficulty to be distinguished from the born criminal. In his case also we have the handiwork of poverty, faulty nutrition, ill-lit and badly-ventilated houses, rickets and anæmia in infancy, then evil example in the family (type, Couteau-Gervasia), prostitution, alcoholism, debauchery, incest, ill-treatment, hunger, the instigation to theft that the children receive from depraved and unfeeling parents, so that they also become wicked and insensate, impudent, impulsive, troublesome, assuming a hostile attitude towards everything that is extraneous to themselves—*e.g.*, enjoyment, good breeding, order, discipline. It is in this way that criminality may have its origin in social conditions and become a matter of habit. The delinquent from habit also presents signs of anomalous evolution (anthropological stigmata of degeneration are not rare), evidences of rickets, hyponutrition and diseases of infancy, and it is very difficult to distinguish him from the true born delinquent. The 'Camorra' in Naples and the 'Teppia' in Milan are responsible for the creation of criminal habits, the former to a very great extent, the latter within narrow limits.

The born criminals ally themselves with this association of evil-doers, finding therein the conditions for a complete adaptation. The two groups resemble one another in form and in their anti-social manifestations, and are distinguished only by their genesis and by the fact that the criminals from habit, not being burdened by psychopathic heredity, are more amenable than the others.

Speaking generally, weakness gives a rather larger contribution to delinquency than strength.

The seasons and the climate have a great influence upon the number and the nature of the crimes. In the North, and during our cold season there is a prevalence of crimes against property; in the South and during the hot season there is a prevalence of crimes affecting persons (Lombroso, Penta, Föinitzky, Kowalewski).

The *prognosis* of delinquency is rather grave. The born delinquent is often very refractory; nevertheless, cases are not wanting of a slow development of high sentimentality. It is certainly not a rare thing for young delinquents with a pronounced psychopathic hereditary burden and with all the features of the born delinquent, after they have reached the age of thirty or forty years, to adapt themselves a little better to the social environment and to live a life that is sometimes irreproachable.

I have observed some such cases, and therefore cannot share the opinions of those who hold the criminality of the born delinquent to be organic and incapable of modification.

The *therapy* can only be ætiological. It is summed up in a social legislation that secures a more vigorous health, efficient labour, and a more equal distribution of the profits of labour and of wealth, which provides a better education, favouring the development of the collective consciousness, which is becoming substituted for the religious consciousness, every day becoming weaker and less efficacious—a legislation, in short, which, changing the system of punishment, in view of the morbid nature of the crime, eliminates one of the surest and most potent causes of delinquency.

CHAPTER VI

EPILEPTIC INSANITY

THE pathological and clinical conceptions of epilepsy, because of their lack of uniformity, cannot easily be given in an always recognisable descriptive picture. Considered from either the somatic or the psychic side, the clinical variety is great, the combination of phenomena varied; the interpretation of the facts and the extent of the field assigned to epilepsy varies according to the different authorities. While, on the one hand, it is a matter of dispute as to whether the Jacksonian form should be considered as epilepsy, seeing that in that syndrome there is an entire absence of any disturbance of the consciousness (Christian), on the other hand it is sought to widen the field of epilepsy by taking in moral insanity and paranoia (Lombroso). It is well, therefore, to come to an understanding on this point. We must decide whether the essential feature of epilepsy is a more or less profound disturbance of the consciousness, or whether a senso-motor feature is sufficiently characteristic of it. In the first case we should have to eliminate from the pathological conception of epilepsy all those convulsive forms that are unaccompanied by profound disturbance of the consciousness and amnesia; in the second case we should have to include all the motor or senso-motor explosions in the widest sense of the word, in which case would be included another group of affections, also essentially represented by motor explosions and by a disturbance of the consciousness, and which, moreover, until now have been considered as forms quite distinct from epilepsy; I refer to the *tics*.

Such a conception of epilepsy, whilst it is wider and embraces morbid forms that have till now been considered to be of another nature, is more rational, because, just as we cannot exclude from the pathological conception of a disease an aborted syndrome such as often occurs as the prelude to a general and complete attack, so it would not be rational to exclude the *tics*, which, after all, are only cortical explosions, at one time senso-motor or ideo-motor, but now withdrawn from the directive power of the consciousness.

They flourish in that very soil of incomplete evolution from which epilepsy also emanates, and in their syndromes we frequently find the psychic characteristic which we shall describe as peculiar to epilepsy.

It is useless to eliminate the Jacksonian syndrome from the conception of epilepsy, because if it is true that it is due most often to traumata, or to circumscribed organic processes operating *in loco* and in no way altering the psychic personality, it is also true that in many cases the Jacksonian syndrome is the first, often brief, phase of the classic epileptic accession—that is to say, it is the beginning of an explosion which, not being under any regulative and balancing influence of other regions of the brain, influence which should be exerted through the associative paths, becomes directed along the projection-paths, giving rise to the convulsion. The pathological importance of the explosion is not to be sought for in the partial or general convulsion, which has no psychiatric value *per se*, but in the want of functional harmony, in the dissociation of the various cortical provinces, in the individualization of one (a sign of lack of discipline amongst them), in the defect of that functional synchronism of the cortex which is the best guarantee of the energy and efficiency of the personality.

Looked at in this light the *tics* appear to be of the same nature—cortical motor explosions, irrational and inefficacious, owing to individualization of cortical areas, in rebellion against the law of co-ordination, of subordination, and of association.

The anatomical substratum of the epileptic does not furnish the means of ready communication between the functioning cortical groups, so that the tensions accumulating in one group under a great variety of internal and external stimuli do not diffuse and spread themselves over neighbouring or distant groups, but discharge themselves through the emissive paths, which are much ampler and more pervious, because older and in longer use. It is to this fact that we must look for the reason of the place assigned to epilepsy in the classification of the psychoses. The irascibility and the impulsiveness which we recognise as the most classic features of the psychology of the epileptic are, after all, the effect of the disproportion between the ample and facile paths of projection and the narrow, less numerous and less practicable paths of association. Thus are rendered possible the high tensions which discharge themselves, under inadequate and disproportionate stimuli, by the primitive motor paths (including those of the vaso-motor nerves) and by the simpler motor co-ordinations—viz., those expressing anger and those by which the epileptic performs actions bearing the character of simplicity and of primitivity, owing to defect of association. They therefore cause injury, more or less serious, depending upon the disproportion between the weak associative power of the brain of the epileptic and the associa-

tive power, which is also regulative and moderating, of the brains of the group to which the epileptic belongs.

The reason for the preference which, in my opinion, must be given to the dynamic doctrine of epilepsy is now evident. Epilepsy is connected with the asymmetries that are met with in the cranium and the brain. Asymmetries are also very frequent in the face—*e.g.*, deviations of the nose (Tonnini, Ganel, Féré); in the colour of the irides (Roncoroni, De Boni and Dotto, Féré); in the innervation of the internal and external ocular muscles (Bianchi); in the thorax (Zuccarelli); and in the hands (Vielle). Asymmetry is present in the function of the eyes (the frequency of astigmatism along with plagiocephaly has been noted by De Boni and Dotto), and in the function of the upper limbs (left-handedness: *a*, motor—Tonnini, Lombroso, Roncoroni, Féré, and Bianchi; *b*, sensory—Venturi and Tonnini).

The epilepsy which so frequently develops in maturity in those who in their infancy had irreparably lost the use of a limb owing to acute anterior poliomyelitis, which in the course of years induces an arrest of development in the corresponding cortical zone; the epilepsy which so frequently arises as the result of destructive foci in the brain, or of the pressure and displacement caused by tumours, or of inflammatory processes that destroy the centres and paths and interrupt currents; the epilepsy so frequent in those who suffer from spasmodic logoneurosis (stammering), are all facts supporting the hypothesis that in the epileptic the anatomical substratum consists of the unequal development of centres and paths, rendering possible a high tension in some regions of the cortex or in the subcortical centres, and hence the nervous explosions which characterize this great neurosis in all its forms.

After many years of continuous observation I am still more convinced of the truth of the conception I expressed concisely in the chapter on Epilepsy in the Italian *Trattato di Patologia e Terapia Medica* (vol. ii., part 4, Bianchi and Colucci)—*viz.*, that asymmetry is the most constant and the most characteristic feature of epilepsy both in the anatomical and morphological and in the psychic field.

The whole of the material gleaned from observation, which numerous researches have accumulated with the view of consolidating the pathology of epilepsy and determining its immediate cause, is composed of consecutive facts, of the ultimate effects of the repeated accessions of neurosis, and hence we can get no light shed upon the mechanism of epilepsy from this examination.

As regards its physiopathology, epilepsy is associated with a state of cerebral superexcitability, which varies in different individuals through intrinsic conditions of the central nervous system. On experimenting with well-regulated strengths of the faradic current on the cerebral cortex of animals not under the influence

of chloroform and under presumably equal conditions, in some cases convulsions appear very soon, in others only after very many momentary excitations. A natural difference in the degree of excitability exists between the different cortical zones, as, *e.g.*, in the dog, between the sigmoid gyrus and the visual area on the posterior part of the second external convolution. The time necessary for the production of convulsions by direct excitation of the motor cortex is much shorter than that required by excitation of the occipital lobe. The fact that in one dog electrical excitation of the visual area requires a minimum length of time to raise the tension of the sigmoid gyrus sufficiently to give rise to a convulsive attack, whilst in another we fail to provoke epilepsy even with a stimulus of five times the intensity, must depend on heredity or acquired histo-chemical conditions, which are the true organic substratum of epilepsy. We might reasonably hold that in the first case the biological (physio-anatomical) conditions of epilepsy are latent. Experimental destructive foci in bitches give rise to epilepsy in some only, not in all. Epilepsy thus produced is certainly transmitted to the offspring; on the other hand, the offspring of bitches that have not become epileptic as the result of destruction of the cortex are not exempt from epilepsy, though it is much less frequent. There is determined, then, a histo-chemical epileptogenic condition in the offspring of the hemiplegic mother.

The epileptic psychosis is of the same nature: there is a high instinctive or hallucinatory potential, which has no path along which to discharge itself except that leading to the motor zone, no other being open. The instinct is not normal in character; nor is the emotion, which is always of a primitive nature—fear, hatred, suspicion, and anger of high potential, which discharge themselves through the short circuits of blind, violent, and destructive action. The hallucinations are similar in character; they are exceptionally vivid (high hallucinatory potential) and are discharged with violence, causing the reduction to the minimum of the potential of the entire cortex and loss of consciousness.

When we speak of *excito-motor hyperexcitability* we merely make use of a circumlocution. What is this hyperexcitability? It may be not only of the motor zone, adopting the cortical theory, held especially by the Italian school (Albertoni, Luciani and Sepilli, Tamburini), and by others (H. Jackson, Hitzig, Rosenbach, Unverricht), but also of the sensory zones. If the epilepsy commences with an olfactory or a visual hallucination which is followed by the motor discharge, we must deduce that the hyperexcitability resides in the respective cortical zone, which lacks paths for discharge into other parts of the cerebral mantle except the cortical or subcortical motor centres; in this case the nerve-waves are not transformed into more complex products, which can only occur

through a process of association, but are discharged along the motor paths as soon as they have reached a maximum degree of tension.

The intensity and the violence of the discharge diminish the potential throughout the mantle to a minimum no longer sufficient for the phenomena of consciousness.

Whatever the extent it may be desirable to assign to the conception of epilepsy in this work, we can only describe the mental disorders more universally recognised as epileptic in nature, leaving to separate chapters those other syndromes which have some relation with and resemblance to epilepsy, but which could not be embraced in the conception of epilepsy without the risk of giving rise to confusion in the nosological and pathological pictures of the affection.

The psychic disturbance, which is never absent except in symptomatic epilepsy, consists, at the beginning, of the epileptic character. It is hereditary or acquired (more frequently the former), and manifests itself at an early age—indeed, almost as soon as relations begin to be established between the infant and the family surroundings. Dulness, or at least but scant brightness of spirit, as compared with healthy children; prolonged and obstinate fits of weeping without any assignable reason, sometimes even giving rise to cyanosis of the face; persistence in their exaggerated and capricious desires in spite of every good argument advanced by the mother; the tendency to react by scratching the face or by breaking some object, raising the voice aloud and stamping the feet, and sometimes accompanying their pretensions with threats, are the principal facts generating a well-founded suspicion that the character is developing in an anomalous (epileptic) direction. The suspicion is strengthened when nightmares and terrifying dreams or spontaneous somnambulism co-exist.

In the most favourable cases these signs undergo improvement or disappear, and the child manifests a more normal adaptation to the environment; in the severest cases the upbringing and the family surroundings exercise little or no influence: the morbid character becomes constantly accentuated, and shows an egoistic hypertrophy that nothing can correct.

In childhood and in adolescence the epileptic character in one group of cases very closely resembles the moral character of the born criminal; indeed, no difference can be detected between them: the same inadaptability to the environment, the same preponderance of the individual instinct, the cruelty, the laziness, the vagabondage, the evil life, the precocious and excessive character of the sexual instinct, the irascibility and impulsiveness, are found in both. If at this age (adolescence) convulsions do not yet manifest themselves, the clinical figure is that of the born criminal, provided there has been no occurrence of eclampsia during infancy, in which

case, even though these early convulsions are not repeated, the character becomes clearly epileptic.

In another group of cases the personality is less profoundly disturbed. The representatives of this group are more adaptable to the family surroundings, are disciplined and correct in behaviour, go regularly to school, learn more or less satisfactorily, sometimes show, even under normal conditions, great moral susceptibility, and attend to their tasks at school; if they go to a boarding-school they do not differ essentially from the other scholars, but are excessively impressionable, suspicious, captious, very easily offended—*e.g.*, by a jest or a trick of their companions, or a just reproof from the master; they are extraordinarily irascible, excessive in their reactions, and impulsive.

Such a character is soon exaggerated in the environment of the school and the boarding-house on account of the tendency that school-children have to irritate the most intolerant and the poorest in resource amongst them, by means of jokes, witticisms, and juvenile tricks. Things arrive at such a pass, owing to the impulsiveness, the destructive violence of the reaction, the irascibility and the threats of the victim, that the masters or the directors of the schools are obliged, apart from the existence of convulsions, to send away such youths from the school.

Again, the sexual instinct sometimes shows a precocious development, and males and females alike abandon themselves to onanism and sexual excesses, often in the most barefaced and shameless manner. In this respect the female epileptic resembles the prostitute of whom we have already made mention in the preceding chapter.

In the course of years, at the age of maturity, the epileptic character undergoes further modifications. The epileptic isolates himself, avoiding company and conversation. The disease weakens the bonds that bind him to the social world and strengthens his inclinations towards things spiritual. He becomes more religious, ostentatiously obedient to the rules and rites of religion. Every day he spends some time in the church; at home he recites prayers and chants. He becomes excessively humble, assuming a very meek and submissive attitude when he meets any of his acquaintances. The consciousness of his own inferiority to other men gives him an expression of humility and reverence. Beneath the surface, however, he is often a captious, irascible, violent, impulsive, cruel being. A slight stimulus is sometimes sufficient to make him throw off the mask of humility and religion, and there, stripped of all disguise, in all its hideous nudity, stands revealed the irritated beast, with bared fangs and outspread claws.

Irascibility and impulsiveness, then, are the chief features of the epileptic personality; epileptics lose control of themselves on the least opposition. The inhibitory powers are but slightly

developed. Violent and obstinate in their desires, which are too overpowering for them to resist, they appear egoistic in the highest degree. Even here the defect in the associative work of their brains is evident. Their malicious character is based on the two fundamental sentiments predominant in the epileptic—viz., suspicion and hatred of their kind (primitive emotions, arising from their inferiority with respect to other people, inferiority of which the epileptic is often more or less conscious), along with contrariness and permanent irritability of the proper *ego*. The whole life of the epileptic shows hatred, which, under ordinary conditions, is concealed, and even veneered with good temper, but bursts forth in all its brutality on the slightest provocation; the horrid, the brutal, all that is evil, destruction and death, are present in his mind, though not evident on the surface.

The sentiment of religion in epileptics is of a primitive nature. They are more mystic than religious, and observe practices rather than commandments. With their minds full of prejudices, they exhibit in their conduct the most outstanding paradoxes in the way of delinquency, alcoholic excess, onanism, and other sexual perversions.

The father of Misdea, who was not subject to epileptic convulsions, but showed the most pronounced features of the epileptic character, used to blaspheme under the statue of the Madonna or of Christ during the procession in the chapel every time the members of the brotherhood did not walk in proper order, or did not carry out to the letter the instructions he had given with regard to the procession of which he was the director (Virgilio).

Sometimes they are vain and proud, and in this affective exaltation lies the germ of true paranoia of grandeur, just as in suspicion lies that of paranoia of persecution.

They are fond of wine, and become more brutal after drinking even a small quantity. It is then that they show themselves most exacting, egoistic, captious, obscene, cynical, impulsive, and cruel. It is on account of this remarkable mobility and these strange contrasts that we even speak of double consciousness. Lombroso speaks of 'the epileptic individual formed by the union of two halves of different personalities,' and Féré says, 'The character of epileptics is essentially mobile and explosive.'

In the majority of cases the intelligence is below the normal. In some it is normal; in rare cases it is even above the normal. The physician who has long had a wide private practice can point to a number of epileptics who follow trades and professions, and seem, to all intents and purposes, normal, yet are not really so, because, although there is no true intellectual decadence, the affective side of the mind is more or less profoundly altered. According to Legrand de Saulle, of more than 40,000 epileptics in France, only 4,000 were confined in asylums for the insane, while the rest

performed their family and social duties. The same may be said of all countries. This, however, does not prove that the intelligence of epileptics is, in the majority of cases, normal. A great number are treated in their own homes, troublesome though they be; some even occupy public offices, and many find a refuge in institutions other than asylums. How many, too, remain able to conceal their suspiciousness, their captiousness, their perverted instincts, their illusions, their rapid formation of subdelirious ideas, and their amnesias! Here I would remark that I do not now speak of that epilepsy which is so frequently grafted upon imbecility or idiocy, nor do I even allude to confirmed epileptic dementia.

Feeble capacity of attention is certainly one of the most conspicuous features, as proved by the psychometric investigations of Tanzi, who showed clearly that the mean time of reaction in the epileptic, under ordinary conditions, is about 0.207 of a second, while in normal individuals it is about 0.141 (diminished perceptive and attentive capacity); the oscillations of attention were found, on an average, to be in the ratio of 3 to 2 as compared with normal individuals.

From the psychometric investigations carried out in my institute by Dr. Surdi (prize thesis), it is very evident that the keenness of attention is in general diminished, and that in epileptics, distinguishing them from normal individuals, there is frequently manifested automatism, or suspension of the attentive power, the duration of which in epileptics is reduced to 39 seconds as compared with an average of 93 seconds in healthy individuals.

Epileptics are often indifferent, torpid, given to vagabondage; but even this last characteristic sometimes alternates with a degree of exaltation, during which they are more active and rapid—men of action, as we say.

The intelligence of epileptics in general, says Tonnini (*Le Epilessie*, Turin, 1891), is limited: the perceptions are weak; the memory is unreliable; ideation is variable; grandiose ideas are frequent, as observed in Musolino, also ideas of persecution, mysticism (paranoidism), and indifference to everything that does not concern them. Lombroso has asserted the co-existence of genius with epilepsy in some cases, and with his extraordinary acumen has drawn an analogy between genius and epilepsy. This is not the place, however, to enter upon the discussion of so delicate and abstruse a subject. Amongst the many hundred cases of epilepsy I have met with in my private practice (I leave out of account those epileptics confined in the asylum, for in them mental disturbances are already very pronounced), I have not found one of truly superior intellect. When we consider the average intellectual vigour in these cases (excluding idiots, imbeciles, and epileptic demented), and the almost constant emotional defects, we are justified in concluding that epilepsy and inferiority are two co-existing

terms. Genius is a phenomenon which may coincide and co-exist with epilepsy, but has nothing in common with it.

Of numerous cases which I might bring forward in confirmation of this synthesis of the epileptic character, I shall report one only—that of a lady who has been confined in the asylum for more than eighteen years, in consequence of a report presented by me to the magistrate. When first brought under my notice she was a young epileptic of about twenty-five years (and now over forty), presenting incomplete evolution (imbecility of a slight degree). On account of her captious and intolerant nature she was in continual hot water with the whole neighbourhood. On the morning of a holiday she had a quarrel with a neighbour who had offended her by some trivial but irritating remark. She became enraged, but was able to restrain herself, or perhaps she was unable to retaliate immediately against her rival, who was much the stronger. With her mind filled with hatred and thoughts of revenge, she waited until the other went to church to hear Mass, leaving, as was her custom, her baby alone in the house. Seeing her opportunity, the epileptic made a poker red-hot, and, hastening into her neighbour's house, forced it through the anus of the unfortunate child—a baby of little more than three. The child died shortly afterwards in terrible agony. In prison, where I afterwards saw the offender, in the asylum in which she has been confined for so many years, no feeling of regret has ever crossed her cynical conscience. The injury she had suffered from the mother of the infant well merited the grief caused by the murder of her infant daughter!

As is apparent, if we except the cruel nature of the crime in so far as regards means and form, and the excessive nature of the reaction, the character of the epileptic resembles that of the born criminal. When we consider that in the epileptic there are present the same anthropological degenerative stigmata, the same functional defects (hypo-æsthesia, hypo-algesia, restriction of the visual field, etc.), and also the fact that, genetically, the two branches spring from the same trunk, inasmuch as epileptics and criminals arise from degenerates, from the insane, from delinquents, drunkards, and epileptics, we must agree that Lombroso was not wrong in recognising a great analogy between the born delinquent and the epileptic. It is to be noted, however, that in the epileptic the moral sentiment may be more or less developed; but it is very unstable, and loses its directive power each time the *ego* meets with opposition or is subjected to painful stimuli. In epilepsy crime is occasional and unforeseen; in congenital criminality it is part and parcel of life.

Epileptic Insanity.—Besides giving rise to the morbid nature of the epileptic character just described, epilepsy is a fertile soil in which sprout and live for a short time the most varied forms of psychosis. Mania, sensory delirium, stupor, paranoia, tran-

sitory insanity, are all psychopathic forms that arise from the epileptic constitution of the personality. The epileptic syndromes, however, present somewhat peculiar characteristics, by which they can be distinguished from the genuine forms, so that, whilst they certainly resemble the latter, they have a clinical figure of their own.

Amidst so many different forms, one of the things to which we may look for guidance is the epileptic convulsion, not only when immediately related with the attack of insanity, but also in those cases where the psychic disturbance appears to be independent of the convulsion, as in individuals who have certainly had epileptic convulsions, but in a former period of life. In this regard we meet with very great difficulties only when the patient has suffered from convulsions in infancy or in early youth, and afterwards got rid of them entirely. In some cases, indeed, we may fail to obtain any history of convulsions. The greatest number, however, of epileptic psychoses are related to the convulsion, and usually occur in subjects who have suffered from convulsive seizures for a long time, and they either precede or follow the convulsion, or, somewhat more rarely, are substituted for it, in which case they are termed epileptic equivalents, and such they are in the true sense of the word.

In the majority of cases the epileptic psychosis manifests itself in individuals whose personality has already assumed the features of the epileptic character, which is either developmental or has gradually been accentuated by repetition of the attacks.

Considered, then, in its relation to the convulsive seizure, epileptic insanity is distinguished as pre-epileptic, post-epileptic, and epileptic equivalent, or masked epilepsy.

Pre-epileptic insanity in most instances consists in the accentuation of the epileptic character. The patients become, with increasing rapidity, more querulous, excitable, and provoking, more violent and cavilling, more impulsive, garrulous, threatening, and intolerant. The agitation sometimes rises to such a point that they attack one even for a word misunderstood or a look wrongly interpreted. They are restless, pitch their voices higher than usual, shout, swear, and show destructive tendencies. If they are at table they throw glasses and bowls about for a mere nothing ; break the slabs with their fists or their heads, and tear their clothes ; in their own homes the slightest correction or opposition makes them curse and swear, and, if they get hold of a stick, they smash glassware, chandeliers, and dishes, or, if they are at dinner, give a violent pull to the tablecloth, bringing plates, glasses, and food to the floor with a great crash. Shortly afterwards the convulsion bursts forth.

Others become gloomy, dull, lose their wonted joviality and good humour, avoid company, become much less communicative, and feel themselves oppressed, as though subject to some stupefying

influence ; they feel the approach of the attack, and become morose, irritated, and hostile in spirit ; the appetite diminishes, sleep is broken or disturbed by the frequency of terrifying dreams ; they are often subject to true accessions of anguish, with *raptus* and attempts at suicide.

In another group of cases hallucinations and deliria are present. The hallucinations are of demons, spirits, wild animals, enemies, blood, wounds, corpses, flames, fire, or else are of religious content.

In the last case they see the Madonna, Christ, or saints, as a rule in a vengeful attitude, much more rarely children with wings, and angels. Generally speaking, mystic or mundane beauty is very rare in the hallucinatory representations of the epileptic, whose mental dispositions are in contrast with the pleasure afforded by the beautiful and the good. The commonest auditory hallucinations are those of reports of firearms, buzzings, explosions, confused shouts and words, insults, threats, the condemning voice of God (the God of the epileptics is almost always revengeful and cruel), or commands generally of a religious content ; or there may be disgusting olfactory hallucinations of sulphur, phosphorus, corpses, and more rarely of aromatic substances. The hallucinations are either single or multiple. One epileptic always had the unilateral hallucination (on the right) of a black demon before the attack burst forth ; others have single olfactory hallucinations, often of identical content. With the hallucinations there almost always coexist a psycho-motor agitation of an impulsive and furious character and an emotional state of suspicion and malice, giving rise on the one hand to false judgments, on the other to rapid, destructive reaction. Sometimes there is a prevalence of erotic notions, and in this case the patients abandon themselves to onanism in a cynical and barefaced manner, or else expose their persons without the least sign of shame. In other cases we find a maniacal syndrome, with a happy tone of mind, which, however, becomes threatening and hostile on the least opposition.

The affective states and the restlessness usually last for some days, and in some cases for a week and even longer, whilst the hallucinatory syndromes are present for a much shorter time, sometimes only a few minutes, before the convulsive explosion. Of this period the epileptic preserves no recollection, or at most a very confused one (crepuscular state of the consciousness).

Whatever the nature of the psychic disturbance, it is followed by the convulsion, which may occur during the night or in the day-time, singly or in series. The convulsions may be followed by other psychic disturbances ; these may also manifest themselves without the occurrence of an actual convulsive attack.

Post-epileptic Insanity.—The attack over, the patient rouses himself, opens his eyes, slowly turns his head round ; his look

is uncertain, his manner confused, his movements slow and torpid. As a rule he does not respond to commands, but performs automatic movements in a dull and sleepy manner ; or he mutters some words, or pants weariedly, rests his head on the cushion, and falls into a sleep, during which he often snores. When he awakens, after some hours, he is confused, stupid, cannot realize his present position or how he came there, does not recognise the persons about him ; he utters disconnected phrases, is very excitable, fastidious, torpid, and complains of tiredness and headache ; by degrees his mind becomes clearer, and in a longer or shorter time—an hour to a day—he regains his bearings, and readily recognises persons and positions. If he has had other seizures he realizes what has happened to him, although there remains a blank in memory covering a longer or shorter time antecedent to the attack ; he remains for some hours or a day more irritable than usual, and is gradually restored completely to his former condition. This is the simplest form of post-epileptic stupor.

In other cases, after the first phase of stupor or post-convulsive confusion, with or without the intervention of sleep, a more or less intense hallucinatory delirium breaks out, accompanied by a violent destructive motor agitation. His look is forbidding and sinister, his countenance angry, his eyes injected, his speech excited ; then commences a motor agitation in which he is troublesome, threatening, noisy, and uproarious. Respiration becomes laboured, the pulse rapid and full, the veins of the forehead turgid. If an attempt be made to restrain him, he becomes more excited, struggles violently with his attendants, conducts himself in a violent manner, seeks to make his escape, to bite, pulls off his shoes, tears off his clothes, snorts, roars, butts with his head, and if he is allowed to run free smashes everything indiscriminately ; threatens, strikes those around him, is homicidal and sometimes suicidal. This scene may last several minutes, and even some hours. It is followed by a dazed and confused state, which gradually passes off in the course of one or several days. Amnesia of the delirious period almost always remains.

In cases in which hallucinatory delirium is less intense the patient certainly talks and raves, but shows less motor agitation and impulsiveness. He is confused and, as in sensory insanity, incoherent, in accordance with the visions and scenes passing through his mind. The hallucinatory products become mingled with new perceptions, memories and reminiscences, and we may even have chaotic talk, with verbigeration and stereotyped phrases. The temperature is sometimes raised, the tongue dry, the breath sometimes penetrating or acetonic.

Sometimes the form is certainly hallucinatory, but has a greater resemblance to hallucinatory paranoia ; there is less confusion and disorder ; delirious manifestations show a tendency to organization,

and are of a persecutory, mystic-religious (especially in women), or grandiose nature. The last form tends to be protracted, with alternations of comparative calm and of psycho-motor agitation, never very intense, and lasting from a few days to several weeks. All the features of paranoia may also be exhibited in a fleeting manner.

In other cases we have the appearance of mania. After the first stuporous phase, the patient becomes comparatively amenable in behaviour, the tone of his personality is raised, he is more loquacious, more expansive, more active, disturbs those around him by words or actions, becomes quibbling, more frequently obscene, shouts, sings, whistles, jumps, dances, gyrates, and pushes anyone who comes near him; there is almost always a predominance of hostile feeling, which manifests itself in threats on the least opposition and at every attempt to restrain him; there is a degree of maliciousness much higher than in mania (the simple psychosis).

Sometimes the hostile attitude, with actions to which it gives rise, is all that constitutes the picture of post-epileptic insanity. An example is as follows: A young epileptic with criminal tendencies is brought to the asylum by the city guards, whom he insults with trivial speeches and provoking epithets. At the first examination, immediately on reception, he either makes no response or replies in a high-handed manner, uttering threats and insults, swearing revenge on those who have brought him to the asylum, which he recognises perfectly, having been confined here on a former occasion. When put into a single room, he breaks the window-panes with his fist. On being put to bed, he tears the cover and sheets, threatens and insults the attendants. In his anger and irritation he says he should not have been brought to the asylum, as he has done nothing wrong, and ought therefore to be liberated. He is gloomy, full of threats, and sometimes refuses food. One day he breaks his bed, and arms himself with an iron bar, to injure or kill whoever comes in his way; on another occasion he unhinges a window and barricades the door of his room; again, he breaks the window-panes and arms himself with a long, sharp piece of glass, threatening to kill someone or to commit suicide, thus placing the whole staff in a very dangerous and anxious position. This condition of things lasts about three weeks, after which he is gradually restored to his former condition—excitable, captious, violent, intolerant, prone to criminality, yet at the same time reasonable, adaptable to discipline and work, and no longer hostile and threatening. Of all this period which followed two severe convulsive attacks he has only a somewhat confused recollection (crepuscular state of the consciousness).

Cases are met with, especially in women, of a post-epileptic syndrome with all the features of melancholia, accompanied by depressive, mystic delirium, auto-culpability or demonomania.

In this case the tone of mind is not, as a rule, so depressed as

in pure melancholia, nor is the state of inhibition so characteristic. Epileptic melancholia is in most instances of a loquacious and somewhat aggressive type.

The Epileptic Equivalent, or masked epilepsy, is a mental disturbance of brief and rapid evolution, as a rule accompanied by profound disturbance of the consciousness, and more or less complete amnesia of the period of the duration of the attack. It assumes very different forms: sometimes it is any one of the psychoses described as pre- or post-epileptic; the sole difference lies in the fact that the epileptic convulsion is absent, being substituted by the psychic disorder. Many maniacal forms or recurrent hallucinatory psychoses of brief duration, of which the respective patients preserve no recollection, are epileptic in nature, true psychic equivalents of epilepsy.

Sometimes there is a precursive seizure, preceded as a rule by an intense feeling of fear. An example is as follows: The patient F. belongs to a family with a strong psychopathic taint; he presents many anthropological degenerative stigmata and marked strabismus, very probably resulting from eclampsia in infancy, or from meningo-encephalitis. He has a brother confined in the asylum at Sales owing to severe epilepsy that has resisted all methods of treatment. From time to time he is seized with a strong feeling of fear; everything around him then seems changed and alarming; the physiognomies of those around him appear hostile, and he betakes himself to flight, without knowing whither he is going. He runs fifteen, twenty, and even thirty kilometres without a stop, ere he regains his composure. Finding himself far from home, he does not retrace his steps, much less return to his family, though he remembers the course he took in his flight, but seeks for a means of subsistence, recollecting with fear the place whence he set out. An important feature in this case is the fact that he preserves, in the main, the memory of the time of the attack, with the most of the events that have happened to him.

In some cases the precursive accession is entirely unconscious; the patient regains his consciousness in a distant place, but has no notion why or how he comes to be there. These are cases of what Voisin calls true *epileptic flights*.

The patient mentioned by Borowkoff (*Obosrenije Psichiatarii*, 1899) disappeared from time to time for many hours, and was always found seated in a particular part of a wood, without any recollection of how he came to be there.

The epileptic equivalent sometimes consists of an attack of mental confusion, like a dream, preceded by whispers and perplexity, and followed by sleep. Such a case has been published by Norman Henry (*Journal of Nervous and Mental Disease*, 1899). In this case pure epileptic attacks were absent

Sometimes we have instances of crime followed by prolonged mental confusion.

OBSERVATION V.—M. C. was arrested on April 2, 1900, in Torre Annunziata because he made his way into the barracks of the Municipal Guards and insulted them without reason. He was sent to the asylum. He remembered nothing of what had happened. His father suffered from hæmoptysis; his mother was of a violent and aggressive character. The patient suffered from convulsions in infancy. He has been arrested on various occasions for theft, rioting, and breaches of the peace. He recollects and even boasts of some of these crimes, whilst he asserts his innocence of others. He states that he has been tried several times for pocket-picking, of which he was not guilty. He accuses the police of falsehood, and therefore hates them cordially.

He was readmitted to the asylum on December 25, 1900. He was dazed, responded slowly to questions, not comprehending them, and giving inappropriate answers. He told his name. On the 28th he was less confused; he made adequate replies to very simple questions. He remembered that he had been in prison, he recognised that he was in the asylum in which he had been previously confined, but did not remember why he was brought there. He said that it was possible he had committed a theft or a murder, but remembered nothing. From December 29 to 31 he regained consciousness, and also remembered the crime he had committed. (He had killed his aunt, a hunchback.) He was in good humour, and recounted his robberies with complacency.

There may be somnambulic accessions, during which actions are performed having all the appearance of rationality and free-will (*vide* Part II. of this volume).

Criminal acts are sometimes committed with a certain appearance of free-will. Here are some examples:

A lady is out walking; at a certain place she enters a shop, murmurs some meaningless words, and makes an attempt to steal some objects made of tortoise-shell. Surprised, she sees her mistake, but is unable to explain why she is in the shop and in possession of objects she had no wish to buy.

A young lover, not being able to obtain the consent of the lady he loves, one evening conceals himself on a road along which she has to pass. On seeing her he falls upon her, strikes her repeatedly, embraces her, ejaculates, and falls asleep on her corpse (Virgilio).

Ottolenghi and others have published interesting cases.

A young man of twenty-three years, who had not previously suffered from convulsions, one night murdered several members of his family. In the morning he found himself lying in bed between two corpses; he knew nothing, recollected nothing; only one terror-stricken child, spared from the carnage, was able to recount what she had seen the preceding night (Tschisch, *Journal of Mental Pathology*, 1903).

In some cases, such as that observed by Bechterew, the accession consists in the loss of memory for a period of time—*e.g.*, twenty-four hours; from this state the patient suddenly passes into a state

of full consciousness ('*Periodische Anfälle retroactiver Amnesie*, 'Obosrenije Psichiatriti, 1900).

These cases are at bottom only protracted lapses. A very simple case is as follows: A young man, in his twenty-first year, has come to consult me. While telling me of his trouble, he breaks off, turns pale, mumbles and mutters unintelligible words; with his hands he performs inconsequent movements, like a blind man seeking for something in his clothes. After less than a minute he comes to himself again, passes his hand over his forehead, and takes up the thread of his discourse.

In similar states epileptics may perform acts of indecent exposure. There is the case of the judge who, whilst performing his high function, rose and urinated in the presence of the public, and on being reproved by his colleagues remembered nothing of it (Legrand de Saulle); the honest man who unconsciously masturbated in the most frequented thoroughfares (Morselli); and the young *fiancé* who, on his marriage day, approached his bride, and before all the guests attempted to masturbate, without afterwards having any recollection of it (Lombroso).

Finally, the epileptic equivalent sometimes assumes the form of paroxysmal tachycardia, with difficulty of breathing, anxiety, sometimes loss of consciousness, and other psychic disturbances (cases of Talamon, Lecorché, Pitres, Venturi, and especially those of Bellisari—*Riforma Medica*, 1890).

There may be obsessive ideas of theft or of homicide, often preceded by headache. The following is an example:

OBSERVATION VI.—D. G., unmarried, a mason, has never suffered from convulsions. He presents many somatic and psychic degenerative stigmata—flat occiput, receding forehead, lop ears, Darwin's tubercle, dental prognathism, and obscene tattoo-marks. As a child he used to flee to the open country without knowing whither he was going, and would sleep on the ground or seek shelter in some cabin. Out of revenge he attempted to set fire to one of the houses of correction in which it had been necessary to confine him. Intolerant of reproof, he very nearly destroyed the eyesight of a brother who rebuked him mildly, and he severely wounded a companion for an innocent jest. Having joined a ship as cabin-boy, he passed a considerable time in various prisons for being mixed up in sanguinary riots and for attempts at escape. One day, finding himself at Genoa in the company of marines, he was suddenly overwhelmed by a terrible homicidal idea, which he immediately proceeded to carry into execution. He bought a knife, with the intention of killing the first person who should come in his way. In the public gardens he met an unfortunate man, whom he wounded very severely. He was delirious during the whole night after his arrest. (From the thesis of Dr. A. Mele, prepared in great measure from material in the Neapolitan Clinique.)

Some also regard as epileptic equivalents those nocturnal terrors of infants depending upon dyspnœic disturbances of respiration, inasmuch as those disturbances would be the cause of

dreams that give rise to the nocturnal terrors (Graham Little and J. Green, 'The Causation of Night Terrors,' *Pediatrics*, vol. viii., 1899).

It is very doubtful if we can regard ambulatory accessions with more or less perfect preservation of consciousness as epileptic equivalents. Donath, who refers to some such cases, does not admit that loss of consciousness is an essential feature of epilepsy, for such loss depends on the degree of excitement of the cerebral cortex. According to him, the essential feature of epilepsy consists in a morbid excitation of the cortex, which manifests itself instantaneously, returns periodically, runs a typical course, and disappears rapidly (*Arch. für Psych. u. Nervenkr.*, Bd. xvii.).

The patients can sometimes give a reason for their actions during the ambulatory accession, but after the accession there is complete loss of memory of the occurrence (case of McCarthy—'Epileptic Ambulatory Automatism,' *Journal of Nervous and Mental Disease*, 1900).

Sometimes we have an alternation of normal, or comparatively normal, states of consciousness with states of confusion, varying in duration. Köppen's cases of this kind are important, as they demonstrate the change of behaviour that an epileptic may show on different days whilst undergoing a medico-legal examination (*Charité-Annalen*, 1889).

In some cases the epileptic remembers, and can give even a detailed account of, an occurrence immediately after it has happened, yet, a short time afterwards, he has no further recollection of it.

In a very interesting case of wife murder, committed in a small village in the province of Aquila, and brought up before the local court of assize, the prisoner, an epileptic, who committed the murder with blows from an axe and then remained quietly in the house, gave an account of the occurrence to the carabinieri who arrested him, whilst he had still under his impassive eyes the dead body of his wife, and even sought to justify the murder. Some time later, before the presiding magistrate, who in his turn hastened to examine him, he was unable to tell anything, and showed surprise at the crime imputed to him.

In my opinion both in the epileptic equivalents and in the post-epileptic period, when the patient remembers for some time after the epileptic accession all that he has done, and afterwards forgets it entirely, we have a condition resembling the state of double consciousness, during which time the subjects do not lose relations with the external world and with the past, yet lose the memory of that period completely when the state of normal consciousness is re-established. There may also be truth in the assertion of Salgò, who compares recollection after the epileptic attack to the same phenomenon after dreams ('*Die Bewusstseinsstand in epilep-*

ischen Anfälle,' *Allgemein Zeitschr. für Psych.*, Bd. lvi.). It is clear, however, that we cannot always speak of complete amnesia and of unconsciousness, for we meet with facts that disprove such a statement. Not only is amnesia wanting in some cases, as that I have referred to, and as Tamburini was the first to prove, but in some cases we have undoubtedly to deal with true duplication of the consciousness.

I believe there is a good deal of truth in what Thomson says—viz., that the constant and distinguishing feature of epilepsy is the instantaneousness of the attacks, and not the loss of consciousness, which may be obscured in different degrees, without, however, being completely abolished (*Knickerbocker Press*, 1900).

It is interesting also to note that memory is often later in being reinstated than the perceptive capacity, so that a man in this state may recognise persons and objects, and even express perceptive judgments, yet afterwards, when the personality is re-established, remember nothing of such perceptions and judgments.

These facts are especially important from the medico-legal point of view, as is also the fact that the crime committed may often seem premeditated and logically connected with preceding data. The husband who kills his wife with whom he has had bitter dispute, and the young man who assaults and violates his sweetheart, even wounding her, because of her persistent refusal to yield to his desires, translate into action, in the unconsciousness of an epileptic attack, some of the preformed psychic compounds, glossed over with that veneer which, even in the epileptic, gives an appearance of reason in the adaptation, derived, perhaps even in the egoistic sense, from the knowledge of the moral relations and the social laws, these putting in movement those scanty regulative powers with which he is furnished. This gloss is destroyed by the breath of epilepsy, and the preformed compounds acquire all their excito-motor power in the complex structure of 'the unconscious,' this imparting an appearance of logic to the criminal actions committed in the pre- and post-epileptic, as well as the epileptic equivalent, states.

As is apparent, the epileptic equivalent, also known as masked epilepsy, assumes the most varied forms, which, however, are distinguished from one another by certain features, even when there is no record of epilepsy. Those features are the instantaneousness, the brevity, the recurrence, the disturbance of the consciousness, the amnesia (very frequent if not constant).

It is certain that, when such syndromes are manifested in epileptic individuals, no difficulty in diagnosis is met with. The difficulties arise when the person to whom the supposed epileptic equivalent is attributed, is said never to have suffered from epilepsy. In such cases it is necessary in our examination to direct our attention to three facts that often escape observation: (1) Epilepsy, crimi-

nality, or alcoholism in the family ; (2) well-marked epileptic character ; (3) eclampsia in infancy, which is nothing else than epilepsy of infancy, with which the late epilepsies are very frequently allied, although other causes are invoked to explain them—alcoholism, syphilis, some doubtful injury, or an intestinal intoxication.

Protracted Confusional or Crepuscular States.—A condition of confusion sometimes persists for many weeks, and even for several months, after convulsive accessions, even, in rare cases, when there has been no outward evidence of such an attack.

In these cases the consciousness is more or less profoundly disturbed ; the perceptions are slow and incomplete, the judgments erroneous or falsified by illusions ; even hallucinations arise from time to time ; thought is torpid and slow, association less active and erroneous, the delirious ideas now fleeting, now persistent, as in hallucinatory paranoia. In the confusion there is sometimes outlined a delirium, with a tendency to become systematized. The delirium is of diverse content—grandiose, proud, mystic, or persecutory, in which case it assumes rather the character of that presented by the persecuted persecutor. There is in all cases mental dissociation ; there are lapses of memory and a state of confused memory, in which there is a mixing up of things real with things imaginary ; alternations of loquacity and stuporous arrest, of profound confusion and of almost normal lucidity, great affective excitability or dreaming states ; the patients are self-absorbed, and react only to very intense stimuli. There are soliloquies, verbigeration, excited language, paraphrasias and dyslogias ; later on, a confused, lacunar memory of all the long period, with occasional remissions. Complete restoration is effected slowly. Sometimes these states are not followed by recovery, but leave behind phenomena of mental decadence, whilst the epileptic character is almost always left more accentuated.

The different psychopathic pictures I have sought to reproduce here on general lines are accompanied by anthropological anomalies and functional disorders. On these points congenital delinquency and epilepsy almost perfectly coincide. The same anthropological stigmata are found in criminals as in epileptics, save that plagiocephaly, plagioprosopia, oblique cranium (Lasègue), and macrocephaly are more frequent in epilepsy. Very marked plagiocephaly is often related in its genesis with meningo-encephalitic processes in infancy, just as macrocephaly is related with rickets and hydrocephaly, which frequently produce epilepsy. The broad and high forehead, the large nose, the long and heavy face, and the thick lips, lend to the epileptic a physiognomy quite recognisable.

Amongst the functional disturbances are to be noted : spastic hemiplegia, diplegia, atrophy of the optic papilla, strabismus,

bilateral homonymous hemianopsia, all of which give evidence of the existence of old processes that have occurred in the cerebral mass, and are always, or almost always, accompanied by epilepsy. There are frequently noted the same anomalies of sensibility mentioned in connection with born criminals.

Special mention is made of a particular kind of expression by no means confined to the epileptic; it is the so-called metallic look, the 'metallic gloss' of Tschisch ('Larval Epilepsy,' *The Journal of Mental Pathology*, 1903). According to this author, it is a characteristic sign of essential epilepsy, cannot be confounded with the clear look of mania and of hysteria, and is due to a particular intoxication. There is no doubt the physiognomy of the epileptic is characteristic when the forementioned anthropological signs are present, particularly when accompanied by the furtive, sinister, and uncertain look—a very valuable sign.

Disturbances of speech are frequent (Ross, Kahlbaum, Clark) and very varied. The most frequent is a form of explosive, spasmodic bradydylalia, with a heightened pitch, and, as a rule, a monotonous tone of voice. When the disease is of long standing, verbal amnesia is also frequent. In the post-epileptic phase we may have word-deafness or word-blindness, or echolalia. These dysphasias have the same signification as the post-epileptic paralyses, whose disappearance, like that of the dysphasias, does not invariably go hand-in-hand with the reintegration of the consciousness.

I have often found stammering (spasmodic lalaneurosis) in association with epilepsy. Even in the absence of convulsions one often finds in stammerers a character closely resembling the epileptic.

Alessi and Pieri, of the institute of Professor Sadun, found rapid and wide variations in the elimination of phosphoric acid, thus proving to their minds that in the epileptic there is an oscillatory state of the functional capacity of the chemical groups of the various tissues of the organism, corresponding to the morphological and psychic asymmetries.

Whether myoclonus is to be considered as analogous to epilepsy, being dependent upon the same lesions as are the cause of epilepsy, is a matter that requires many well-conducted investigations for its proof, notwithstanding the fact that the cases of Seppilli and of B. Verga and P. Gonzales (*Annali di Neurologia*, xvii.) lend support to such a view.

Ætiology.—This is the same for epileptic insanity as for the convulsive form of epilepsy.

Heredity plays the greatest part, and in most instances is direct and similar. The epileptic generates the epileptic. Alcoholism is the next most potent factor. When alcoholism does not produce epilepsy in the drunken father, it induces it in the offspring; and

when alcoholism cannot be proved in the parent, it can be traced to the grandparents or the great-grandparents (Robinovitch). In 140 cases of epilepsy examined by Robinovitch, the direct antecedents in ninety cases (64 per cent.) had been alcoholists. The old observations of Nothnagel, Westphal, Fürstner, and Krafft-Ebing have been confirmed by Christian, Francotte, Ottolenghi, Seppilli, Lui, Pianetta, Bratz, Salgò, and others.

Now that the doctrine of the toxic origin of epilepsy has come to the front, in consequence of the labours of Voisin, Haig, Teeter, Weber, Agostini, Marinesco, Ceni, Ferranini, and others, it finds almost no opposition to-day, and, indeed, claims most of the scientific convictions in this regard. When, however, we attempt to prove by actual facts the hypotheses formulated and accepted with such freedom, we find them to be upheld more by the subjective consent of the majority of authors than by really incontestable proofs.

First of all, it is well to establish the fact that it is not a question of specific intoxication, but of a great variety of intoxications giving identical results. Indeed, while Voisin, Herter, Massalongo, Christian, and Agostini hold the intoxication to be produced by toxin generated in the gastro-intestinal canal, Haig maintains an accumulation of uric acid, and Krainsky of carbonic acid, in the blood; others consider it due to the toxins produced by infective disease suffered by the mother during pregnancy; others, again, attribute it to alcohol (Bratz and Salgò, Luise Robinovitch, Féré).

Some observers, such as Voisin and Bra, would like to connect epilepsy with the presence of micro-organisms (streptococci) in the blood, a condition which Besta was unable to confirm.

This is a question of considerable interest, for all the observations thus far recorded go to prove that, even granting the toxic origin of epilepsy, the intoxication would be produced by normal substances derived from the tissue metabolism (uric acid), or by those generated as the result of altered interchange in the tissues, or by toxins and ptomaines in the intestine, or, lastly, by exogenous toxic substances (alcohol, absinthe). When, on the other hand, we consider the identical forms of epilepsy, provoked, in the first place, by a splinter of bone driven into the cortex, and in the second by exciting with electricity the cerebral cortex, preferably certain zones, the toxic origin of epilepsy must be reduced to its true value. In my opinion epilepsy depends upon the inherited structure of the brain, or upon the alterations therein induced by the action of some poisons that have long been in operation, *e.g.*, alcohol or syphilis, and by coarser lesions. It is certain that only in the long run (after many years of abuse) does alcohol give rise to epilepsy, and only after months or years does a trauma give it—that is to say, when they are followed by histological alterations that break the functional rhythm of the various parts of the brain, which we hold to be the basis for a regular flow of the nerve-waves.

On the other hand, examination of the urine in epileptics gives no certain result.

According to the researches of Deny and Chouppe (*Comptes Rendus de la Société de Biologie*, 1899), the urine of thirteen epileptics proved no more toxic than the urine of normal individuals. The enthusiasm of Féré, who found the pre-paroxysmal urine thirteen times more toxic than the post-paroxysmal, was extinguished by the researches of Chevalier of Lavour, who found diminution of the urotoxic power in the state of epileptic excitement. The conclusions of Brugia, Tamburini, and Vassale are unreliable. Whilst Mirto and Agostini admit a true increase of the urinary toxicity in epileptics, and especially in the period preceding the attack, Marinesco and Serieux, and Mairet and Vires found a constant hypotoxicity after the attacks and in the intervals between them. Again, the experiments of A. Keester, carried out on rabbits, dogs, and monkeys, did not confirm the toxicity of the blood of epileptics before and after the attacks (*Journal of Nervous and Mental Disease*, 1899). The labours of Didi and Stenuit (*La polyurie et l'excrétion de l'urée dans l'épilépsie*, 1899), who almost always found the percentage of urinary substances in epilepsy under the normal, allow of no sure conclusion. The diminished alkalinity of the blood found by Lui during and immediately after the attack, is of no signification in the pathogenesis of epilepsy. No doubt, were we to find a constant diminution in the quantity of uric acid in the urine in the twenty-four hours coinciding with the manifestation of the accessions, as Caro found in one case (*Deut. Medicin. Wochens.*, 1900), the doctrine of Haig would receive considerable support; observations of a like kind, however, are scarce and even contradictory.

The variety of results cannot even be attributed to the methods followed, however different they may be, for the differences presented are too great—so much so that sometimes they seem wholly opposed to one another.

The researches of Pellegrini (*Riforma Medica*, anno xvii.) would appear to be of greater value. This author has found the cerebro-spinal fluid of the epileptic to be very toxic immediately after the accession, and less toxic some time afterwards. Those observations, however, being few and isolated, cannot yet contribute to the genesis of epilepsy.

The toxic doctrine of epilepsy accordingly represents an attempt at interpretation, and perhaps the endogenous intoxications represent only a coefficient in the ætiology of the great neurosis.

The investigations carried out on the blood of epileptics possess no greater value; it is sufficient to mention the results of the researches of D'Abundo and of Ceni, results completely opposed to one another, in order to realize the extent of the dubiety surrounding this subject, dubiety not lessened by the researches of Voisin and

Peron, of Legrain and Guerin, of Mairat and Vires, and of Herter, who could educe no conclusion from his experiments (*Journal of Nervous and Mental Disease*, 1899).

The experiments upon the teratogenic power of the blood of epileptics would appear to be of more value. The numerous researches of Ceni, following on general lines the methods of Féré, have convinced him that epilepsy is due to an alteration of the tissue metabolism, whence the formation, then the presence in the blood, of a toxic substance that induces in the embryo deviation, especially of the brain, from the normal evolution, and irritates the cerebral cells of the developed brain. The epileptic's accessions would be caused by this irritation. According to Ceni (*Rivista Sperimentale di Freniatria*, 1897, 1899, 1900), the intoxication is not casual and intermittent, but general, permanent, and constant, apart from the accessional manifestations. This pathological conception should lead Ceni to seek for a rational cure founded on the doctrine of serum-therapy. This would have a logical basis were intoxication in epilepsy shown to be a constant factor.

There can be no doubt that up till now there is no fact to warrant such a hypothesis being held as proved.

Though intoxication may be held to be the direct cause of the epileptic accession, whatever its form, psychopathic heredity, direct or collateral, is the true cause of epilepsy; above all, epilepsy in the family, alcoholism, criminality, paranoia, and cerebral hæmorrhage. Acute sensory insanity, mania, and especially melancholia, are of rather less importance.

All the organic diseases of the brain may give rise to epilepsy, but more particularly destructive foci, cysts, hydatids, and tumours.

Traumatata, even when they do not produce lesions of the bone or meningeal hæmorrhages, may give rise, after a longer or shorter time, sometimes after years, to epilepsy. Without doubt an injury, even when it does not produce hæmorrhages at the seat of action or in remote (opposite) sites, determines alterations in the minute structure of the brain, which must be regarded as a direct and immediate cause of epilepsy.

It is thus that alcohol and syphilis act. It has been stated that the majority of epilepsies developing in maturity are of syphilitic origin. I maintain that the syphilitic genesis of epilepsy is much exaggerated. A considerable number of late epileptics are burdened by severe psychopathic heredity, and have suffered from eclampsia in infancy. Now, it is a simple matter for all who have an abundance of clinical material at their disposal to convince themselves that the epilepsy of maturity in individuals who have suffered eclampsia in infancy is only the continuation of the latter, which is in reality infantile epilepsy.

Frequently associated with epilepsy we find rachitis (rachitis

of the head), and, according to some, even thymic asthma, which is related to the lymphatic constitution (Ohlmacher); these may be considered as causes of epilepsy.

The *pathological anatomy* of epilepsy is still very obscure. With the exception of the teratological conditions met with in the cerebrum and cerebellum of epileptics (asymmetry, greater simplicity of the sulci, continuation of some sulci with others through absence of intervening folds), we can express a legitimate doubt with regard to all the other anatomo-pathological features as to whether they are not rather the effect of the epilepsy than the process from which the epilepsy emanates. There is one group of epilepsies which is excluded from the preceding synthetic consideration—viz., that group whose genesis is certainly connected with the presence of destructive foci or of other processes in the brain (tumours, foreign bodies); but even in these cases we may ask if these states are the immediate cause of the epilepsy, or if they represent a remote and indirect cause of the mechanism whence epilepsy is produced (*vide ante*).

The teratological anomalies above mentioned are certainly significant of incomplete cerebral development, and are found in delinquents and imbeciles as well as in epileptics. Among investigations in proof thereof we may mention those of Wildermuth, Dercum, Benedikt, Ferrier, Lemoine, Mingazzini, Tenchini, Ottolenghi, and Roncoroni. It is not to be thought that these anomalies are not found in the brains of normal individuals, but their proportionate frequency in epileptics is certainly very significant.

The meninges in general are either normal, as when the epilepsy is not of very long standing, or more or less opaque, thickened and sometimes adherent to the cortex. In some rare cases, such as that referred to by Uselli and Venanzio, we find more serious meningeal and even osseous alterations (bony plates situated alongside the longitudinal sinus, covered with membrane and adapted to the cerebral convexity).

To the naked eye the cerebral substance often presents a normal appearance (Gowers, Féré, and many others). As mentioned a short time ago, apoplectic cysts, focal or diffuse sclerosis, encephalitis, porencephaly, and cysticercus* are comparatively frequent; but, as I have said, these lesions do not represent the immediate anatomical substratum of epilepsy, and they are found in the most diverse parts of the brain, even when the epileptic convulsion at the commencement partakes of the Jacksonian character. The old belief that these lesions should be found in the vicinity

* Cerebral cysticercus is rare in comparison with the frequency of epilepsy. It gives rise not only to all forms of epilepsy, but also to epileptic insanity with deliria, hallucinations, impulses, and furor (Lombroso, Martinetti, Tirelli, and Lui).

of the Rolandic zone has been refuted by facts (observations of Gonzales and Verga, of Seppilli, Ventra, and several observations of my own). The cerebellum, the corpus striatum, and the medulla oblongata are no rare sites for such processes in epileptics.

After the researches of Meynert, great significance was attached to the cornu ammonis (Meynert, Sommer, Beliakoff, Fischer, Gowers). A more accurate investigation in this connection has been made by Borosdin, Rosenstein, and Ljubimow ('*Ueber Veränderungen des Ammonshorns-bei Epilepsie*,' *Obosrenije Psichiatrit*, 1900), who in nine cases of epilepsy have found notable lesions in the cornu ammonis—degeneration of the cells, disappearance or shortening of the protoplasmic processes, atrophy of the elements of association, proliferation of the neuroglial elements, degeneration of the vessels, infiltration of the perivascular spaces with leucocytes. These alterations, however, have not the value of a specific lesion as regards either nature or site, because they are found throughout the cerebral cortex, and also in other diseases, so that they must be regarded rather as an effect of the repetition of the convulsive accessions.

In the cases where the brain appears normal the histological alterations are reduced to minute alterations of the cerebral cells, especially to the increase of the neuroglia, and to nutritive alterations in the vessel-walls.

Chaslin found in epileptics a variety of cerebral sclerosis which he considered non-inflammatory, but inherited, primary, and constitutional. Amongst the more or less altered nerve-cells are found neuroglial fibrils, which in some parts of the brain are increased to such an extent as to form bundles of neuroglia, with a large number of neuroglial cells. In these fields the capillaries are scarcer, and some even obliterated. Such a finding has been generally confirmed (Féré, Kinsburg, Blocq, and Marinesco).

Alterations in the cells and vessels, as well as increase of the glia, were found by Marinesco in rabbits in which he had produced a form of experimental epilepsy by means of injections of an extract of absinthe ('*Contribution à l'étude de l'anatomie pathologique et de la pathogénie de l'épilepsie dite essentielle*,' *Médecine Roumaine*, 1899). Nevertheless, he does not believe that he is warranted in concluding that these alterations represent the genesis of the convulsive accession.

Degeneration of the myeline of the fibres appears to have been observed by Marinesco and Serieux, employing Marchi's method.

Olmer, Marinesco, and Serieux, using the most recent methods of staining, have found very marked chromatolysis of the pyramidal cells, displacement of the nucleus towards the periphery, and degeneration of the nucleoli. Some believed they had found hypertrophy of some pyramidal cells (Colucci, Marinesco); Bleuler has found hypertrophy of the layer of neuroglia under the pia mater;

Alzheimer has found alteration of the tangential fibres. Even these alterations, however, are not specific, being found to an equal extent in a great variety of diseases.

In one case in which death occurred during the status epilepticus and in another where death occurred during a severe and prolonged convulsive attack, I found at the autopsy a marked congestion of the meninges and of the cerebral cortex, extravasations of blood at different points of the brain, especially in the gray substance, and cerebral œdema.

In analogous cases cellular lesions have been met with, particularly in the vicinity of the vessels, and these also presented recent alterations.

In some cases the thymus has been found much enlarged.

Bacteriological researches have brought to light the presence of the bacillus of diphtheria, the staphylococcus, and the *Bacillus mucosus capsulatus* (Friedländer).

After this brief review I express the conviction, not the mere suspicion expressed by Marinesco, that the lesions found in the brains of epileptics are the effects of the repetition of the accessions.

Diagnosis.—The diagnosis of the epileptic psychosis is founded principally upon the definite history of epilepsy. The historical inquiry must be made to cover the whole life, not omitting infancy (eclampsia), and must also embrace the family history (epileptic parents or relatives).

In the absence of historical data, the best criteria are :

1. The suddenness with which the psychic disturbance arises, no matter what its form.
2. The profound disturbance of the consciousness, and the phenomena of psycho-motor automatism.
3. The ready remission of the phenomena, with amnesia, complete or incomplete, of the whole period of the illness.
4. The existence of the marked anthropological signs that are most frequently met with in epileptics (plagiocephaly, plagio-prosopia, oblique cranium—so-called by Lasègue).
5. The presence of residua of old cerebral diseases (infantile spastic hemiplegia, asymmetry in the limbs, strabismus).

Admitted the possibility that the epileptic equivalent may run its course without profound disturbance of the consciousness (although this occurs rarely), many forms of transitory insanity may be considered as epileptic equivalents, whilst other cases come under other morbid states well recognised to-day, especially the coercive impulsions, the raptus melancholicus, and the provoked transitory excitement in states of dementia. I do not share the opinion of Venturi and Tonnini, who distinguished transitory insanity from epilepsy ; on the contrary, there is a distinct resem-

blance between transitory insanity and the epileptic equivalent—in fact, it is impossible to draw a distinction between them (Lombroso, Tanzi, Congresso Freniatico Italiano in Siena, 1886). Even the acute psychosis from alcoholic intoxication sometimes runs its course like an epileptic equivalent. In this case the patient's history helps us, even when there is no evidence of somatic alterations produced by the alcohol (neuritis). Sometimes we have to deal with alcoholic intoxication in an epileptic.

The diagnosis of a psychic disturbance following upon an epileptic convulsion at the commencement of progressive paralysis is very difficult, the more so because in some cases progressive paralysis is initiated with epileptiform accessions which can with difficulty be distinguished from ordinary epilepsy, and may even precede by several months, or a year or so, the appearance of phenomena more significant of the great psychosis. When the intelligence is not perfectly regained, or an inequality of the pupils remains for some time, or when we find the patellar reflex absent, we have good reason to doubt the genuine character of the epileptic attack, and to consider it probable that we are dealing with an initial syndrome of progressive paralysis.

Sometimes epileptic insanity may be confounded with an alcoholic psychosis, the more readily because alcoholists periodically fall into excesses, which may give rise to epileptiform attacks and psychic disturbances closely resembling the epileptic psychosis. It is well to add that an alcoholic psychosis sometimes develops in an epileptic constitution, and that, on the other hand, an attack of epileptic psychosis may be brought on in the long run by the degenerating action of alcohol. In all these cases the history of the patient does not help us, and it is often impossible to make a differential diagnosis between epileptic and alcoholic psychosis, and to distinguish what belongs to epilepsy from what belongs to alcoholic intoxication. On the other hand, such a distinction serves no useful purpose when we remember the relations between epilepsy and alcoholism (*vide ante*). I report here a very recent case bearing upon this question. A young man in good circumstances came up for trial before the High Court; he was the son and nephew of alcoholists, and he himself drank to excess every afternoon, visiting several public-houses. One evening he returned home, drunk as usual, went into the kitchen, took something for supper and demanded a bottle of wine, after drinking which he stretched himself out on a mattress beside the fire. Asked by his wife to go to bed, he refused, and went to sleep on the mattress. When four hours had elapsed he rose, went into the bedroom, seized his wife by the hair and pulled her on to the floor; he then took up a double-barrelled gun, intending to shoot her. The wife defended herself desperately, and managed to disarm him, after which she unloaded the gun by the breech. This done, she hastened

towards her infants, who had awakened, and were terrified by the scene enacted before them.

The husband again took up the gun, loaded it with a cartridge he found in one of his pockets, and turning once more towards his wife, discharged it at her, almost at arm's length, inflicting injuries that proved fatal. This man, in addition to habitual drunkenness, had had, at long intervals, epileptic attacks. There had been no serious dissension between himself and his wife. He afterwards remembered the crime, which was the resultant of two co-ordinating forces—epilepsy and alcoholism.

Again, the history of the cases will be of great help in diagnosing those forms of periodic psychosis that closely resemble one of the pre-epileptic syndromes and are related to the menstrual function in women.

The diagnosis of the hysterical attack (hysterical psychosis and the hysterical equivalent) will be discussed more advantageously when treating of hysterical psychosis.

Prognosis.—The prognosis of the epileptic psychosis should be reserved, bearing in mind that we are confronted with one of the gravest of diseases. The cases that give rise to comparatively little anxiety are those in which the convulsions are rare and the epileptic character has not been developed in its entirety. Mild forms that yield to treatment and do not destroy the character to any marked degree are very frequent. Most serious and intractable are those cases in which the convulsions, more or less intense, are repeated at brief intervals, and where there already exists at least a moral mental decadence. It is not uncommon, however, to meet with epileptic psychoses which are not repeated, even when the convulsions follow one another with a certain frequency. The epilepsy of infancy which has stoutly resisted treatment with bromide is of very grave prognosis, especially so when there are present residua of an infantile cerebral affection (infantile spastic hemiplegia, optic atrophy, microphthalmia, etc.). The epileptic psychosis which is recurrent is grave; the protracted form is the most threatening to the intelligence.

Therapy.—To put the epileptic under conditions that prevent him doing damage, when he shows a tendency thereto, is the first duty of the clinician. This task is entrusted to the asylum physician, and we shall discuss it in the general treatment of the mental affections. The use of the leech and blood-letting have been advised, on the ground of the prevalent doctrines of the toxic genesis of epilepsy, and practical experience has confirmed the efficacy of depletions of blood. To empty and disinfect the intestines as promptly as possible with abundant lavages, to put the patient upon milk diet, to withdraw him from as many stimuli

as possible, are methods of treatment which will help us to obtain, in the shortest possible time, the reintegration of the personality.

Alcoholic liquor in any form whatsoever must be absolutely proscribed. This is of the highest importance.

If the attack is prolonged beyond the twenty-four hours after the application of leeches or the blood-letting, hypodermic transfusion is recommended. The effects of this treatment are often surprising.

The bromide treatment has remained all along the most promising. All the proposed modifications, some of them associated with the names of recognised authorities, have resulted in almost complete disillusion. I refer to Flechsig's method, which from time to time stirs up the hopes of some disciple. G. Leubuscher has found a modification of Flechsig's treatment to be of service—opium in increasing doses for six weeks, then the bromide under the form of bromipine, a combination of 10 per cent. bromine with sesamol (*Monatsschrift für Psych. u. Neurolog.*, 1899, Bd. v.). Adonis vernalis combined with bromide (Bechterew's method) is in some cases decidedly useful, especially when there exists a neurasthenic condition of the heart. In other cases I have found useful a combination of bromide with salicylate of soda in doses of $1\frac{1}{2}$ to 2 grammes of salicylate with 3 to 5 grammes of bromide in twenty-four hours. Some writers, amongst them Amedeo in Italy, have attributed a great therapeutic value to antipyrine, but I have not succeeded in persuading myself of its real efficacy. All the bromides have been tried, and all have found their exponents. Smith (*Lancet*, 1899) has found the bromide of strontium useful in epileptic insanity, but in somewhat larger doses than the bromide of potassium. Others, again, have tried injections of bromipine with some measure of success (F. Schulze, Wulff, Laugenhausen, and Bodoni).

The dose of bromide varies in different cases. In youths and in adults we may certainly regard the minimum dose as 3 grammes in the day, which may be increased up to 10, and even more, according to the results obtained and the tolerance shown.

There are individuals who tolerate well large doses of bromide, and there are others (although much rarer) who either do not tolerate similar doses or derive no benefit as regards the frequency and the severity of the epileptic accessions. In such cases, to persist in the bromide treatment is apt to be injurious, and therefore it is well to abandon it.

The abstraction of chlorides from the food (Toulouse) has not proved a real advance in the treatment of epilepsy. Nitrate of silver, arsenic, and especially phosphorus (also in the form of lecithin), are good therapeutic aids. The powders and fluids extolled as specifics are to be proscribed by self-respecting physicians.

When epilepsy is produced by injuries giving rise to cerebral

compression and all those alterations that are the immediate cause of the seizures, as well as the accessions of insanity that are often associated with the convulsions, it is necessary to remove those causes by aid of surgical intervention (splinters of bone, thickened membranes, abscesses, tumours, cysts), and in every case it will be well to incise or remove a piece of the dura mater, in this way leading to diminution of the endocranial pressure, as advised by Kocher (*Archiv für klin. Chirurgie*, Bd. lix.) and Lambiasi.

In rare cases, even when the epilepsy is associated with accessions of post-epileptic insanity and with abnormal phenomena during the interval, recovery may take place in consequence of a hemiplegia caused by formation of a destructive focus during a long and severe epileptic attack, as happened in Brunet's case (*Archives de Névrologie*, 1900).

For clearer information and fuller details regarding the treatment of epilepsy in general, I refer the reader to Kowalewski's splendid work, *Epilepsie: Traitement, Assistance*, etc., 1901, and also to Pini's *L'epilessia: etiologia, patogenesi e cura*, 1902.

Not long ago Ceni claimed to have found that the serum of epileptics injected into epileptics has therapeutic effects. The serum may be taken either from the epileptic subject himself or from another equally epileptic ('*Nuove proprietà tossiche e terapeutiche del siero del sangue degli epilettici e loro applicazioni pratiche*,' *Rivista Sperim. di Freniatria*, 1901). At first the morbid syndrome would be aggravated (crisis of adaptation), but by degrees the accessions would become diminished in frequency and severity or would entirely disappear. It would appear that only

a few cases have toxic effects been noticed. According to Ceni, the blood serum of epileptics contains both toxic substances and beneficial stimulants. I am not in a position to confirm statements of such great importance. It is certain, however, that they have not found confirmation in the researches of Roncoroni (*Archives di Psych. e Scienze penali*, vol. xxiii.), nor in those of Sala and Rossi (*Gazetta Medica Lombarda*, anno lxii.), who not only failed to induce by that method any favourable influence on the course of the disease, but did not even observe the toxic phenomena described by Ceni.

CHAPTER VII

HYSTERICAL INSANITY

ALTHOUGH all the manifestations of hysteria, including the somatic, are either purely psychic phenomena or intimately connected with them, we shall not make a complete study of hysteria, for that would lead us too far beyond the limits prescribed by the nature of this work.

It is certain that anæsthesia, paralysis, contractions, blindness, deafness, and similar phenomena that disappear without leaving any trace, under the action of a physical agent, or under the influence of an emotion or of some form of suggestion, irresistibly lead us to think that there is an altogether peculiar operation of the brain, and a lack of any demonstrable anatomo-pathological substratum such as we are accustomed to meet with in other nervous or mental diseases; a gross lesion would not be conceivable, in view of the rapidity of manifestations like these, and of the instantaneousness of their disappearance.

This is not the place for a discussion as to which doctrine is best supported by facts—that of hetero-suggestion, or that of auto-suggestion, the doctrine maintained by Sollier in a very meritorious work.*

* It is worth while reproducing here, in their full extent, that author's ideas upon hysteria :

'We have seen,' he says, 'that emotional disturbances act particularly upon those parts of the body that are susceptible to alteration by the actual cause of the emotion, and, on the other hand, that all emotion induces anæsthesia either directly or through reaction. The anæsthesia which is transient in normal subjects may persist in those predisposed to hysteria. The anæsthesia reaches those cortical centres that correspond to the organ to which the sufferer directs his attention during the emotion. This anæsthesia is nothing else than torpor or sleep of those centres' (Sollier: *Genèse et Nature de l'Hystérie*, 2 vols., 8vo. Paris, 1897).

According to Sollier it is therefore the anæsthesia that produces all the phenomena of hysteria, and that anæsthesia may exist in the internal organs when it is not found in the skin. Pierre Janet, on the other hand, regards it as a fixed idea, and in this view he is partly opposed by Sollier. The fixed idea exists in the majority of cases—and in this respect I am in accord with

It is of little interest to us whether a given somatic phenomenon is, in its origin, dependent on a dormant state of the respective centre in the cerebral cortex, as Sollier says, or whether it is provoked by a fixed idea—Janet's theory. On the other hand, what is important to establish thoroughly is the fact that, when a somatic phenomenon of hysteria exists, such as anæsthesia, paralysis, or contractions, the respective cortical centre is not performing its functions; or that such centre, although it may perform its functions, is isolated from all the others, and particularly from the evocative centre in the frontal lobe, where the impression of the moment is brought into relation with analogous impressions experienced by the psychic personality. The somatic phenomena of hysterical subjects are, therefore, clearly psychic, and we must consider them as the expression of a psychic personality whose functions are performed defectively and abnormally. As a matter of fact, whenever a zone of the cerebral mantle is in that state the psychic personality is altered. All individuals who show more or less marked signs of hysteria—and that practically means that a part of the cerebral mantle is either isolated from the working machinery of all the other parts or is working excessively (hyperalgesia)—present a psychic attitude that is altogether peculiar. This has been well defined by Pierre Janet, and it was described by myself even earlier (Bianchi: '*La responsabilit  nelle isteriche*,' *Rivista Sperim. di Fren.*, 1890).

Functional inhibition or sleep of a cortical organ, or its isolation, always induces a more or less significant mutation of the personality.

The following I communicated to the Italian Psychiatric Congress at Milan, 1889:

'There are hysterical subjects who present grave somatic signs of their malady, such as paralysis, contracture, hemianæsthesia, etc., and even although they suffer but rarely from hysterical convulsions, they exhibit a character and a complexity of psychic features decidedly different from those manifested previously; then, although they were neuropathic or hysterical, they did not show the more persistent signs of confirmed and grave hysteria. Such a difference in behaviour and conditions, which we can now consider with cer-

Janet—but it is determined by the somatic hysterical disturbance. This represents a point of concentration for, or polarization of, the mind of the hysterical subject. It is a subconscious state of attention, having reference to the part that does not perform its function. Frequently, however, it is a question of images and emotions that have previously occurred, even though at a very remote period, and it is the image that determines the form the picture will take. If a hysterical subject has once seen a paraplegic, he will, when under the influence of an emotion, have paraplegia, with or without convulsions. If another hysterical subject has seen an attack of hemiplegia or of vomiting, no matter at how distant a period of his life, emotion will reproduce in him exactly those symptoms, which remain in the background of the mind of the hysterical subject, with a high reproductive potential.

tainty to be a form of what is known in its most classic form as "duplication of the consciousness," has been observed by myself in five out of seven cases; two of these I saw in the hospital to which I was attached as physician at Naples, while three were observed in my private clinique. Here I shall relate briefly the two most important cases that came under my notice, one of them at the hospital of St. Eligio, and the other in the Ospedale della Vita at Naples.'

OBSERVATION VII.—N. C., a woman of about thirty years, married and having children, was received into the hospital of St. Eligio 'for apoplexy,' which had left behind it complete hemiplegia. When I was called to examine this patient, and possibly to apply electric treatment, I diagnosed hysterical hemiplegia, hemianæsthesia, amblyopia, dyschromatopsia, etc. This woman always appeared to be extraordinarily merry, thoughtless, and facetious. She was of an enterprising and insinuating disposition. She won the love of the other patients and of the Sisters. She was moderate and agreeable in her hilarity; she seemed to pay no heed to the grave paralysis; and, by contrast, she aroused on all sides a strong feeling of pity. On the other hand, she spoke of her husband and her children with a lack of interest all the more surprising in view of the good nature that illumined her countenance, because it symbolized complete affective anæsthesia.

She would also speak smilingly, and with clear signs of psychic anæsthesia, of the misery, the squalor, and the hunger that were the torment of her beggared children and her husband (mild hysterical mania). After she had been cured of the paralysis by a few applications of electricity, she became more composed and serious, being preoccupied with, and fully conscious of, her own wretched position and that of her family. She was no longer facetious, but showed herself grateful and rather sad. As though she had conceived the notion of a high duty; that hitherto had remained outside the threshold of her consciousness, she asked to be dismissed in order to look after her family, and that with a degree of solicitation that formed a solemn contrast to the merry and thoughtless disposition of mind she displayed so long as she was hemiplegic.

OBSERVATION VIII.—A young woman of twenty-six, of fairly good social standing, was received into Ward 1 of the Ospedale della Vita. For seven months previously, paraplegia had been developing, and that had been preceded long before by convulsions that were certainly hysterical in character.

There was a slight degree of muscular flaccidity; both anæsthesia and analgesia were present. The patellar reflex was well preserved and normal, while the electric excitability of the paralyzed muscles was also normal. With such a combination of symptoms there was no difficulty in diagnosing the nature and the hysterical origin of the paralysis, although the convulsions had not recurred since her admittance to the hospital, nor had any modifications of the disease been noticed.

After not more than six applications of faradic electricity, while every day her attention was called to those muscular movements of the thighs and legs that were thus provoked, in order that her vision might aid in recalling the images of movement, and reawaken confidence in her own muscles, I adopted one morning the artifice of telling her that from certain signs I had reason to believe that she would be cured, and that the next morning she would rise from her bed without any assistance.

The suggestion thus made had a marvelous effect, for the following

day she awoke, jumped out of bed, ran about the ward, kissing the other patients, and proclaimed her own complete cure with inexpressible joy. A notable change in her mental attitude had occurred. Throughout the whole time that she was bedridden, she was the torment of the ward, of the doctors and the Sisters who attended her. She was capricious, discontented, petulant, selfish, thankless, troublesome, overbearing and indifferent to the sufferings of her companions in misfortune. She experienced an irresistible desire to attract towards herself alone the interest and the care of the doctors and of the nurses. She would constantly alternate from weeping to laughter, and *vice versa*, although both manifestations were illogical, both in origin and duration. When the paralysis disappeared she was quite another woman, being modest, affable, of good disposition, ready to help, and generous.

These two patients were certainly not cured of their hysteria, and therefore, after the disappearance of the most persistent and durable manifestation of the trouble, they were not perfectly reintegrated in their original personalities. Not that any grave disturbance of their consciousness happened to be manifested during the somatic illness, for neither defect of memory nor break of continuity in the thread of their psychic lives had been noticed; still, without any doubt, a new and unusual direction given to their moral character and their affections, introduced grave disorder into the whole of their mental lives.

The somatic phenomena of hysteria, which show great variety and mobility, find their counterpart in the psychic character, which reproduces essentially, though under another form, the mobility and the variety of the somatic phenomena. These two orders of facts both prove the weak affinity between the various elements that constitute the psychic personality of the hysterical subject; that is to say, the affinity between them being feeble, there is weakened discipline as regards the relations of the various cerebral departments, which ought to concur harmoniously to allow the personality to find its expression. The result of this harmonious co-operation is manifested in what we call character. The fundamental traits of character in each person, evident in all the various stations in life, owe their uniformity to the solidity of the relations between the various cerebral parts.

Here also, as in epilepsy, we are obliged to call to our aid a dynamic doctrine, recognising the possibility of an excessive change of the dynamic potential required for the functions of the separate parts of the brain, of which the various departments are charged and discharged alternately, contrary to what happens in epilepsy.

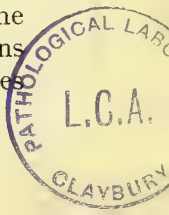
In correspondence with the fact that anæsthesia and hyperæsthesia occur in turns, and that the paralysis passes into contracture and the contracture disappears from one member to present itself in another, the moral and intellectual character of the hysterical subject furnishes an example of paradoxical contrasts between mental states that are utterly opposed to each other. Without any apparent external cause, hysterical subjects pass from joy to sadness, from laughter to weeping, from love to hatred, from timidity to temerity, from utter lack of will to decisive

enthusiasm. Tardieu, Laségue, Legrand du Saulle, Schüle and Jolly, among others, who have made a profound study of the moral character of hysterical subjects and of their psychic constitution, apart altogether from hysterical insanity, all express the same opinion. They present the same picture, coloured with the same tints, of the motives that influence the minds of hysterical subjects. That picture has been reproduced, corrected, and copied by other noted writers, and it represents, in an appreciable form, a scientific fact that is thoroughly established.

The predominant note is one of exaggerated affective excitability, which resolves itself into a series of acts through circuits, upon which the inhibiting power that emanates from the higher cerebral centres has no effect. Those centres, very little developed originally, are absolutely prevented from performing their functions by the lower centres, which are overcharged at high tension. The activity of these latter is altogether put at the service of the inferior ego (egocentric), and the inferior ego, exposed to all influences, uncontrolled and uncontrollable, internal and external, is changeable by reason of the non-operation of the regulative centres, which are the true depositories of historical experience; and in conformity with the law of adaptation and of conservation of the personality, that experience it is which regulates conduct. Affective irritability, vibrating under slight stimuli, gives us the key to those sensory judgments, almost reflex and uncontrolled, and therefore explains the illogical sympathies and antipathies.

In no other subjects is the law of contrast so wonderfully manifested as in hysterical persons. Owing to the fantastic representation of opposite images, strictly connected one with another, chasing one another through the consciousness, the orientation of the mind is altered, its intonation changes, and sympathies and antipathies occur alternately, with attraction and repulsion for the same persons or the same things.

The free course allowed to these tendencies, which meet with no obstacle in the consciousness, as the inhibitory powers do not act, causes hypertrophy of the ego in this, its new direction; and while, on the one hand, the subjects shake themselves free of all restraints due to social relations, such as duties, respect or pity for others, they have an insane desire to excite interest and to draw upon themselves the great interest of those around, with which object they resort to every degree of originality and of paradox that their minds can conceive, sometimes exaggerating their sufferings with the aid of the sharpest trickery. Thus it comes about that persons affected by hysteria have an irresistible liking for deception. With their double-dealing and lying they carry their mystifications to such a degree that they can mislead the keenest observers. They make false accusations against persons for whom they feel an invincible antipathy, which in most cases



has no justification at all, and they support their accusations with a web of tales that are absolutely imaginary, but so well woven together that they give the story an air of verisimilitude, and render it very credible indeed. They lie, not always for the pleasure of lying, and their impulse to deception is sometimes so exalted as to become a delirium (*Lasègue*). They are exceedingly egotistical, and according to their degree of culture and the surroundings in which they live, they will attempt to interest the persons about them or the whole population of a country.

To satisfy this irresistible craving they often go through most grotesque performances on the stage of life, and in the days in which we are living they will frequently deliver their tales through the medium of newspapers, which are often the willing servants of triumphant vanity, that vanity itself being the expression of psychic degeneration. These true representatives of 'oversensitiveness' always find a suitable stage on which to play their parts.

It is this spirit of contradiction and this mania for exciting the interest of the public that drive some hysterical subjects, even the most intelligent of them, to give themselves up to charitable and generous undertakings. Whether it be that a strong feeling of pity arises through the law of contrast, or whether religious feeling is predominant, or if, again, it is tormenting vanity that imperiously demands the performance, they display unexpected altruism, subscribing to associations for protecting the weak, visiting hospitals, founding new charities, or joining in the work of existing ones. They go about with much activity, and figure as great benefactors; and they are so, although their motive is simply exaggerated egoism.

Sometimes hysterical subjects create for themselves deities, to which they sacrifice their persons in religious zeal; or they imagine demons, to whom they give the form and figure of those unfortunate persons who have incurred their illogical antipathy, and with whom they find themselves in conflict for various reasons.

Then, they make false accusations, and in their exalted fancy they find the most brilliant colours in which to set forth their case before the courts of justice and to fascinate judges and juries. Such an antipathy for certain persons may become the first cause of criminal acts, the carrying out of which occupies and dominates the whole of their consciousness like a fixed idea. According to a clever expression of *Esquirol*, this is a species of 'catalepsy of the soul.' This idea was made use of many years after by *Janet*.

Such subjects are masters in astuteness, and they practise every refinement of simulation. Their irresistible desire to make themselves interesting urges them to concoct grotesque and ridiculous comedies, which bring trouble into honourable families, and sometimes have a tragic ending. In these cases no small part

is played by anonymous letters, which they write in order to make trouble and sow discord (Dally).

If it be true that the end justifies the means, the hysterical subject makes the most ample and insane application of this doctrine. To execute his intention, which is generally egoistic, he indulges the strangest ideas, and hatches most dangerous plots, which he thoughtlessly puts into effect. In a family, hysterical subjects sometimes disturb the domestic peace, claiming proofs of affection, which they will often reject, particularly from their husbands, against whom they will inveigh unceasingly in their aggressive spirit should they meet with the slightest contradiction. In their teeming imagination they organize slanders and accusations, and they maintain them even before courts of justice, in certain more or less scandalous actions for separation. Their lucidity is such, and they speak with such an accent of conviction, that they influence judges in their favour.

With their spirit of contradiction and controversy, their duplicity and simulation, their inveterate and incessant need of lying without any interest to serve, they take advantage of the strangest and most inconceivable means and occurrences. 'They abandon themselves to the most unjust, ridiculous, false and bizarre suppositions. As the love of truth is not in any way the predominating virtue of their characters, they never relate facts as they really happen, and they deceive husbands, parents, confessors and doctors' (Morel).

The acuteness and the unheard-of boldness which women affected by grand hysteria will display in order to deceive are astonishing, and, says Charcot, particularly when the doctor is to be the victim of their imposture.

The intellect of hysterical subjects is not of a superior order—almost never so. There is an appearance of vivacity and of readiness in many cases, but neither soundness nor continuity of reasoning or of action is to be found underlying that phosphorescence, which is often deceitful. The powers of perception are sometimes marvellously fine, and they are utilized in reading the thoughts of other people, as is proved by the interesting studies of Tamburini, Guicciardi and Ferrari on this subject. That keenness of perception enables the hysterical subject to feel stimuli, which, owing to distance or feebleness, never approach the threshold of the perception, or even attract the simple notice, of the generality of men.*

Such keenness of perception generally remains isolated, and in no wise does it form an integral part of the intellect, which appears rather to remain a complacent spectator of a phenomenon that

* Among other cases, I remember one of a young woman, blind (hysterical amblyopia), and paraplegic, with left hemianæsthesia. One day she heard the various pieces of music that were being played by some of her cousins who lived more than one and a quarter miles away. This fact was thoroughly inquired into and verified.

is extraneous to the formative process of the series and the syntheses of thought.

These subjects are credulous and susceptible to suggestion. A person who is master of himself changes his thoughts, convictions, actions and mental phenomena at will; but the mind of some hysterical subjects is as the keyboard of a piano, capable of being performed on, so that from it the skilled artiste can draw motives for the most opposite emotions, different in tone and in character. For this same reason these people are more disposed than any others to imitation: hence the readiness with which hysteria became epidemic, especially among girls in schools. Notable examples are also to be found in the history of the Middle Ages (Guislain, Abri-cossoff, Bianchi).

Their attention has no fixity. Automatism predominates much more than in epilepsy. The very interesting studies of Binet and Janet on 'the unconscious' were made on hysterical subjects. The attention is weak, flighty, interrupted, and is exhausted in a very much shorter time than in normal individuals, except in the case of matters that have a direct bearing on the personality or the views of the hysterical subject.

Every person will understand how much this factor contributes to the frequency of errors in their judgment of persons, circumstances, and things.

Their memory is halting, unreliable, and sometimes confused. A hysterical subject lacks the faculty of bringing an event into relation with its circumstances of time, place, and person. As her fancy is very fertile in products that are inherent to the theme that actually besets her mind (hysterical monoideism), and as these new products are represented with much vividness, there may very easily arise a transformation of the reality, more or less altered by the fantastic additions.

Certainly all hysterical subjects do not present this morbid picture, nor are the lies always a product of their wills. In most cases, on the contrary, as Pitres was the first to note, it is a question of vivid imaginative representations; or there are highly-coloured representations, subsequently taken for reality, owing to a particular state of the memory; or it may be that dreams have left obscure records, but still sufficient to determine actions in which the hysterical disposition finds pleasure.

It is these peculiarities of the hysterical mind—mobile, subject to emotion, fantastic, dreaming, egoistic, dramatical, and prone to duplication—that give rise to hysterical delinquency, a form of moral insanity that has its own quite peculiar character, and which it is worth while to illustrate here by some observations.

OBSERVATION IX.—On the evening of January 3, 1885, Paolo Conte, student of theology, in his twenties, belonging to Castellamare, told how, as he was returning from a walk and had reached the neighbourhood

of his own house, he was attacked by three individuals. One of them, after referring to the doings of the Bishop, to magnetism (hypnotic), and to the opuscle of Dr. Fusco, gave him a heavy blow under the chin; the second struck him over the hat with a stick, and when Conte took to flight, discharged a pistol at him, but missed; lastly, the third aggressor, who was found standing against the corner of his house, said to Conte, 'You have given the name of Palmigiano,' and at the same time struck at his chest with a dagger. The unlucky Conte managed to parry that thrust with his umbrella, and so got off uninjured.

The attack had been preceded by anonymous letters, and as soon as the first of those threatening letters reached Conte, he suspected that the author of them was the priest Giuseppe Palmigiano, for Palmigiano had shown hostility to Conte as soon as ever the story of his cure by means of magnetism had got abroad.

Palmigiano had also urged Conte's mother to make him divest himself of the sacerdotal habits, and that matter was referred to in one of the anonymous letters. These suspicions became almost a matter of certainty when Conte heard one of his aggressors mention the name of Palmigiano, a former secretary of the Catholic Society of Castellamare, and editor of the paper *La Guida dell'Operaio*, which journal was doing its utmost to discredit the magnetic or hypnotic cure, in order to revive the efficacy of the miracle worked by Pius IX.

As a matter of fact, Paolo Conte, who was of a timid nature and not very old, apart from being an invalid, was absolutely incapable of offering any resistance, so that his three supposed aggressors, who were strong and robust men, armed with daggers and firearms, had no great obstacle to overcome in carrying out their criminal intention to murder him had they wished to do so. The three men informed against were sent for trial before the Correctional Tribunal of Naples.

After this first attack, of which the story was told by him in detail, Conte thought it advisable to go away from Castellamare, and took a room in Torre Annunziata, in order 'to escape the wrath of his enemies'; but notwithstanding that precaution, on the evening of February 6, as he was returning home, he was again attacked by an unknown man.

The circumstances of this attack deserve to be told in some detail. To secure his safety, he lived in Torre Annunziata under the special protection of the police. On the morning of the 6th he wished to go to Castellamare, and the policeman accompanied him to the station. When Conte returned from Castellamare the policeman was at the station to meet him and accompany him back to his house. However, when the two had got to within a little distance of Conte's house, the latter expressed his desire to call on a friend, and as he intended to remain for some time, he dismissed the policeman, saying that his room was only a few steps away, and that he would be all right.

When he was going home some time later, and, according to his story, after he had passed the alley at the side of the palace and drawn near to the lamp that shone upon the stairs, in order to see what time it was, an unknown person snatched away his watch, which he was holding in his hands, and then struck him repeatedly, saying, 'You gave the name of Valenzano. Remember that he belonged to us, and give these blows to Fusco—give them to Fusco!' Conte attempted to justify himself, but he was not listened to. Instead, he got a cut with a knife on his left arm from the aggressor, whereupon the young student ran up the stairs; but just as he reached the last step he fell, and his aggressor discharged firearms at him, but did not injure him.

This story of the two attacks, as related by Conte, formed the basis of the accusation and trial.

Previous History.—His mother, when young, suffered from hysterical

convulsions. No other member of the family showed any noteworthy signs of neuropathia or psychopathia.

The intellectual development, the tendencies and the character of Conte during childhood and adolescence, disclosed no items of interest. There was nothing notable to be observed in his case until he reached the age of eighteen years. On the contrary, according to the report of Dr. S., attached to the seminary of Castellamare, he had been a very docile and studious youth, so much so that an exception was made in his case, and he was allowed to take the minor Holy Orders all at once, instead of successively, at regular intervals, in the mode prescribed by rule.

It is difficult to ascertain anything as to his sexual life. According to his own story, which he told with complacent simplicity, it would appear that up till now he has turned a deaf ear to all the flattering words of Love. He himself explains that in his own way. On his admittance to the seminary he saw a youth who suffered from hæmoptysis, and who died of that malady. A companion told him that the deceased was a victim of onanism, and Conte was horror-stricken at the revelation.

Five years previously, as the result of a fright, he had a certain trembling that lasted for some time. He was still in the seminary, and had had some words with some of his comrades, with the result that he felt that his *amour propre* had been wounded. The resulting emotion was so great that, for the first time, he was seized with convulsions, completely losing consciousness and amnesia.

When he recovered from the attack, the particulars of which have not been recorded, his right hand was contracted. Three days afterwards the contracture extended also to the upper part of his left arm, so that he required assistance in feeding. At the same time there appeared in the contracted limbs a trembling, comparable to wide oscillations, while a certain psychic disturbance manifested itself, for he was tormented by the fixed idea of the offence that he had suffered and of the hurt to his self-esteem.

He remained in that state for five months, during which time fresh convulsions supervened, always of the same type, and they increased in frequency, until several occurred every day.

He had already had to leave the seminary. The contractures disappeared, but the trembling remained (hysterical tremor?). He was therefore prevented from continuing his studies, and his ecclesiastical career was interrupted; but one evening, whilst his family were repeating the rosary, he fell asleep and dreamt, according to his own story, 'that he had a vision of Pius IX.,' who told him that he would be cured of his malady if he touched an object that had belonged to the Pope. The following morning he went to the Bishop and told him of the vision that he had had the previous evening. Monsignore, who was a shrewd man, assured him that there was nothing at all strange in what he had just recounted, and presented to him an autograph of Pius IX., inviting him with religious authority to touch that signature of the Pope. As soon as Conte had done so he was cured of the tremor in the upper limbs. In his interrogatory he asserted that such an idea had never passed through his mind, and that no one had ever suggested it to him.

This miracle was noised abroad and made a great sensation in Castellamare and beyond. The fanatical Catholics magnified the matter and shouted 'Hosannah!' while they sent Paolo Conte on a mission to Pope Leo XIII. At the Vatican he was cordially received by the Pope and the Cardinals. They gave him kisses and gifts, counsel and encouragement, and the youth returned to Castellamare intoxicated with faith and with vanity, and apparently extremely happy at being able to resume his interrupted ecclesiastical career. But before seven or eight days had passed Paolo was again seized by a convulsion, on recovering from

which his upper limbs were so severely contracted that others had to feed him. The convulsions continued, always with the same characteristics, while there also appeared spasmodic paraplegia of the lower limbs, which lasted for four or five months.

When he was in this condition he met Dr. Fusco at the house of a family of his acquaintance. The doctor assured him that he could effect a cure by magnetism, and when Conte had consented he removed the contracture of the hands in a few minutes. 'At that moment,' said Conte in his interrogatory, 'I could not believe in my own existence, and I was afraid that Fusco was really possessed by a devil. I was in fear, and I hid from Fusco the paraplegia of the lower limbs. I was satisfied for the moment with regaining the use of the hands, and as for the rest I trusted to the future.'

Still there was no recovery, and Paolo determined to resort again to the magnetic cure of Dr. Fusco. With a few magnetic passes the doctor cured the contracture of the lower limbs at one interview. When the contractures had disappeared, it seemed to Conte that there was no longer any obstacle in the way of his continuing his studies and his ecclesiastical career. He therefore presented himself to the Bishop to inform him of his cure. The Bishop, however, told him that he was possessed by a devil, and reproached him bitterly with trusting to the magnetic cure. He ordered him to divest himself of his sacerdotal habits.

It is difficult to say what impression was left on Conte's mind by the words of the Bishop, but it is certain that when Conte returned home he was again seized by convulsions, which recurred seven or eight times in a day, this continuing for more than a fortnight. When he had got over these, on the advice of Dr. Fusco, he went again to the Bishop to lay before him his very ardent desire to become a priest; but Monsignore was firm in his refusal, and as Conte was leaving the Bishop's house he was seized by convulsions in the hall. These were followed by catalepsy, and he continued in a cataleptic state almost the whole night. Towards morning he was carried to his own house. Fusco came at once, and 'his magnetism' freed the patient from the catalepsy.

In the meanwhile grotesque anonymous letters were passing, threatening Paolo, his father, the Bishop, Dr. Fusco, and others. Here are some of them :

Anonymous Letter addressed to Paolo Conte, and attributed to the Priest Palmigiano.

'CASTELLAMARE,
'June 3, 1885.

'PAOLO,

'Thou bearest the name of an apostle, but thy deeds are not the apostle's deeds, nor are the actions of thy life. Recover thy belief; hear my counsel, for if thou listenest to me thou wilt find salvation both of mind and of body. Thou art far from the truth. Thine eyes are blinded, and thou rushest to perdition. Such has been thy conduct that the way of the priesthood is closed against thee; put off the device of Christ, for the malignant influence of the abyss weighs thee down.

'Thou art a brazen-faced fellow, a liar, a *hypocrite*; and thinkest thou to conceal thy nefarious character with the habit that thou wearest? Thou art mistaken, for all is known, and the earth itself, even the very mud, rises up to bear testimony against thee, who art rejected of Nature, of man, and of God.

'Thou remainest obstinate in keeping up a part thou hast played two years or more. Who, thinkest thou, will tear that habit from thy back? Certainly it will come to that, for thy dishonourable and squalid person has filled the measure full to overflowing.

'Thou art lost ! It is true that the mercy of God is great, but thine iniquities have exceeded it, and therefore thou must be abandoned to thy fate, which now I predict for thee :

Thou wilt sink from stage to stage of evil until thou fallest into the abyss, and no tidings of thee shall ever more be heard. I make the sign of the cross.'

Anonymous Letter.

'Rid thyself at once of that devil of a friend of thine—or death !

'The Church will ever triumph.

'Our Bishop will always rule.

'We all of us have been, and still are, and shall be, strong to combat.

'Thou wilt meet thine end at our hands.

'The truth of this will soon be found.

'BLOOD !'

Anonymous Letter.

'God wills it.

'Time will pass.

'Thou wilt not be carrying an umbrella.

'We obey.'

Anonymous Letter.

'Evangelizo tibi gaudium magnum.

'Thou hast escaped once. The time will pass, but no word shall be spoken. Turn thee at all costs.

'Throw off that habit, depraved creature ! God wills it, and human strength cannot stay the just wrath of the mighty Creator of the universe.'

Anonymous Letter addressed to Paolo Conte, attributed to the Priest Palmigiano.

'SIR,

You are a rascal in every respect, and you will not listen to anyone who would show you how to do right. It will be the worse for you, because from now I shall no longer indulge in words, but shall pass on to deeds. If you do not wish a mighty hurricane to burst upon you, put off that habit ; then you may have dealings with the devil, or with whomsoever you please. You are unworthy to, and you must not, become a priest. This I tell you in God's name, and this I shall maintain.

'You are a shameless fellow, a scoundrel, a debauchee, and a liar ; therefore I cannot suffer Christ's flock to have in its midst a fellow who represents everything that is most disgraceful and abominable.

'Brazen and shameless wretch ! whom do you expect to take that habit off you ? Will you force me to make your dishonourable and blameworthy life a matter of public talk ? Well, I assure you that I shall do so. Go to the devil, for only there will you find yourself at home ; for as to your endeavour to keep up an appearance of honesty, I assure you that you are flattering yourself if you think it successful.

'Shameless and disgraceful wretch that you are, take off the priestly habit, and go and live the life of an assassin ; for that you were born, and thither your malignant star is leading you. You will see me again, and that will be a terrible moment for you.'

Another Anonymous Letter.

'VILLAIN,

'Have done with this ; otherwise we shall put an end to it. Although you escaped the first time, think not to escape again. Confess yourself, and put an end to the whole thing.

'God is always with us, and we shall not abandon our task, because we are sons of God.'

Anonymous Letter to Michele Conte, the Father of Paolo.

'MICHELE,
 ' You wish to make your son a priest ? Bravo !! Very good !!!

What a worthy priest is there !!!! Set him to work in the fields, and let him prove the stuff of which he is made. Truly I say unto you, Michele, that my greatest regret is to see that poor theologian reduced to such a sorry case. . . .

' Look to this matter and at once strip the cassock off the back of that demon son of yours ; otherwise you will see how many other bad effects will follow from your course.

' A true friend of yours,
 ' N. N. '

The day after the assault Conte stammered, was rigid and torpid, while there was a feeling of weight in his right limbs. Shortly afterwards he completely lost consciousness, and had incomplete hemiplegia on the right side, as there was no trace of facial paralysis. His tongue was shrunken in the mouth. The paralysis was flaccid.

Conte remained in that condition for about four days, and when he began to recover consciousness, his tongue was so shrunken and so much contracted that he could not put it out of his mouth. There was hemi-anæsthesia on the same side as the paralysis.

On the second day following the attack fever developed (nothing is known of his temperature on the first day), reached a maximum of 39° C., and lasted for seven or eight days.

Thirty-five days elapsed before he recovered the power of motion in the lower limb, and the upper limb recovered only subsequently to that. In fifty days the hemiplegia was almost completely cured, so that the patient could use his right upper limb, although it was still very weak. Two months after the attack recovery was perfect.

About a fortnight before our interrogatory Conte suffered a new attack of an apoplectic nature, with clouding of the consciousness, heightened colour in the face, and transient hemiplegia on the right side. The medical attendants resorted to bleeding at the nape of the neck and at the mastoid processes, and the patient was very soon restored through this treatment.

Paolo Conte is a young man of twenty-two or twenty-three years of age, well developed, with limbs and trunk in good proportion. In his bearing he is somewhat of a dandy, being, moreover, of a slender build. He has a thick growth of hair, blonde and tending to albino. The eyes are light blue and shifty, while his look is not particularly intelligent, being rather languid. The skin is extremely white, with faint spots of red. His lips are bright red, and wear an almost constant smile. He is not altogether unprepossessing, but he is not interesting. He has no hair on the body except on the pubis. His beard is sparse and only nascent. He bears no anthropological signs of degeneracy. The circumference of his head is 56 centimetres.

All the organs are sound, and perform their functions normally. I make particular mention of the vascular system, which presents no pathological features. The genitals are regularly developed, but, on Conte's own confession, they have been subjugated by his 'will,' against which they have never rebelled, not even in sleep.

The cutaneous sensibility is everywhere well preserved, and is even exquisite in proportion to the delicacy of the skin. There is no disorder of the special senses. The field of vision is normal, also the power of

vision in both eyes. Conte also recognises all colours very easily, as well as their different shades.

The superficial reflexes are quite perfect. The patellar reflex is normal, but the tendinous reflex of each hand is notably exaggerated.

There have not been any true psychic disturbances, excepting, of course, the catalepsy that he suffered in the Bishop's house, and the attack of apoplexy. Conte is of average intelligence, with a mediocre degree of culture for a priest. His faculty of memory suffers lapses, and he often makes errors, due to the failure of this faculty, when he is asked to give dates and events precisely. His will, if we are to judge from the fact that he became subject to Fusco, whose instructions he followed blindly, cannot be considered to be developed to that degree we look for in a normal man.

Conte's sentiments are all weak, and in their mechanism the idea of his own personality plays an important part. At the seminary a trivial offence, such as often occurs among youths, was sufficient to make him break into convulsions for the first time, and that 'offence to his *amour propre*' tormented his consciousness for many days. He shows great affective excitability and highly passional states.

Not only does he love his family, but he is unspeakably delighted with the care and attention that his parents and brothers heap upon him, and he is intensely pleased at the pity that he inspires in others, taking up the attitude of a victim of the villainy of this world and of the will of God; but when his mother, wearied with the struggles of many years, was alone in her house weeping over the hard fate that had befallen her and the misfortune of the son, upon whose ecclesiastical career she had fixed her mind in hope, he, as a sufferer from paraplegia, was going about the streets of Castellamare on a hand-cart drawn by a donkey, looking out for his friends and amusing himself.

Even although he had been educated in a seminary, a school of religion and faith, and though neither from his own intelligence nor from his surroundings could he derive other sentiments to replace those inspired by the Catholic school, yet one fine day, simply because he had been offended by his Bishop, he repudiated the Catholic religion, and spoke with sarcasm of the miracle worked by Pius IX.

In the public hall of the tribunal he pointed out ironically, and with an air of ill-disguised disdain, the relics of Pius IX. that had been presented to him by the Cardinals and by Pope Pecci at Rome. During our examination he made very unseemly remarks about his enemies and the Catholic party.

He is notoriously vain. When the case was being heard in the public courts he showed himself quite pleased, smiling with an amused air, as if the whole matter did not concern him in the very slightest. The interest taken by the public in his case exercised an indescribable fascination on his mind, and nothing could move him or make any impression on him. On the day when it became my duty to state in public my opinion of his mental condition, and when I had to emphasize his tendency to lie, to bring false accusations against those whom he hated, to make a drama of every occurrence, to pretend that he had been attacked, to write anonymous letters, to wound himself and accuse others of the deed, to implicate honest people in grotesque or scandalous judicial cases, there he stood opposite me, always smiling and quite undisturbed. To a gentleman, probably a journalist, who asked him for a photograph, he replied with great satisfaction: 'Yes, I shall give you two—one showing myself in civil garb as I am now, the other taken when I wore the habit of the priesthood.' He made a theatrical display of his malady. He recounted the various phases of it to everybody, not like one who suffers or has suffered a great deal, but with an air of satisfaction.

Two months after the trial had taken place, and all those whom he had accused were condemned (for my opinion that he was feigning was not accepted by the judge), he awoke as if from a dream, recognised all the evil that he had done, and came to me, declaring : ' I do not know how or why I have performed this comedy ; I invented the whole business ; but now it seems to me as if I had been in a dream, and had obeyed some superior force. Only now does the reality of my existence appear plain to me.'

Here is a case of hysterical delinquency, following upon a true duplication of the personality :

OBSERVATION X.—On June 21, 1896, the Questor of Naples laid before the Public Prosecutor a case of fraud committed by Madame S., as alleged by the victim, Car. A. The latter was in the omnibus of the Hôtel Pagano, in the island of Capri, when she made the acquaintance of Madame S., who declared herself to be Sibilla R., of American birth, and belonging to Canada.

' She won my friendship,' said A., ' with her very nice manners, and got me to believe that she was betrothed to a German gentleman attached to the German Embassy.'

Meanwhile A. went to Portici, and a few days afterwards, on June 11, she received a visit from S., a second visit being made on the 16th. On that last occasion, S. said that it was her birthday and she had been the victim of a great misfortune, for her pocket-book, containing 300 lire, a cheque on Florence, and a portrait of her betrothed, had been stolen from her in Naples, so that she was without resources. She added that she had been to the office of the Questor to lodge a complaint.

A. believed the tale, and out of compassion gave her a deposit receipt for 500 lire, so that she might cash it at the Casa Meuricoffre and bring the money to her. She intended a part of that sum to meet the needs of her friend.

After awaiting in vain for some days the delivery of the money, A. went first to the Casa Meuricoffre, and, having ascertained that the deposit receipt was quite in order, she went to the Hôtel de Russie, where she learned that S. had removed to the Hôtel Continental. At the last address she ascertained that S. had left for Tunis, and that she had stayed in that hotel under the name of O. B. Meanwhile, when the Questor of Naples was transmitting A.'s complaint to the Public Prosecutor, it was learned from other quarters that the *soi-disant* Sibilla R. B., under the name of Silvia B., had been wanted by the police of Viareggio ever since the month of March past for fraud and false statements whereby she had got the better of A. T., banker. The Prefect of Como also telegraphed :

' I request you to try to arrest the famous swindler, S. L. S., aged forty-four, from London. Middle height, elegant figure, always dressed in dark colours ; dark brunette, with marks of pimples on the lower part of the face. Black hair, with artificial curls ; no earrings. She frequents the principal hotels, always changing her name. She commits fraud by means of cheques that she extracts from her fellow-countrymen, with whom she gets on intimate terms. Last known to be at Palermo, where she said that she was leaving for Rome, Milan, and Pallanza.'

Further than that, on May 4, 1896, the Questor of Rome sent on a note in which he said that the *soi-disant* R. von B., against whom a warrant for arrest had been issued by the examining magistrate there, was considered by the German police to be a particularly dangerous thief, and that she had finally been identified as S. L. S. S., or the widow B.,

born at London in 1852. By order of the Council of Frankfurt-on-the-Main, dated October 9, 1894, she had been confined in an asylum as an incurable and dangerous lunatic, and it would appear that she had escaped from that asylum some time previously.

When the accused was examined at Palermo she repeated exactly what she had told us, and what is reported in the clinical history of the case. She admitted that she had assumed the surname B., not in order to conceal her own name, but simply because that was a pseudonym that she had used for various literary publications printed in American papers; and she had a good reason for not giving her proper name, for she had escaped from an asylum, and was afraid of being taken back there.

She admitted that a post-card written to A., under the name of B., was her production, and she added that if she had done a dishonest action she would not have written to her friend at all.

Moreover, in a report made by the Questor of Naples to the Public Prosecutor, dated September 17, 1896, it is said: 'No sooner had she been taken to Palermo than she confessed to some acts of fraud committed there and at Cernobbio, but she stoutly denied having defrauded A. of 500 lire. It is known that the accused had made a round of the principal cities of Italy, continually changing her name, and committing frauds everywhere. The chief inspector of this office of Questorship took up the search for her in person, and yesterday S. was arrested at Syracuse.'

She had been convicted of fraud in France and in England. In France she was once shut up in an asylum for kleptomania.

The foregoing is a summary of her life for the last few years.

She was brought to the psychiatric clinique under my direction on November 27, 1896, under the name of S. Luisa Susanna fu Guglielmo, of London, aged forty-four, widow, Catholic.

I proceed to relate everything that I have been able to learn about this woman.

In her family there had been a remarkable number of sufferers from diseases of the chest, or from tuberculosis. Her father died of phthisis at the age of fifty. He had attained a high rank in the British army, had fought valiantly in the Crimea, and was for some time in India and in Afghanistan. Her mother was a Frenchwoman, very nervous, and a sufferer from hemicrania. A maternal aunt, a Superior of the Sisters of Charity in Italy, had also been neuropathic. One brother was drowned at sea, while another died of tuberculosis; the latter was at one time in Parliament, and wrote several books. Three other brothers died in infancy, of ordinary diseases. Two sisters have chosen to remain unmarried because of ill-health and chest troubles. The accused has had scarlatina, measles, and latterly rheumatic fever. For a certain time she was anæmic to a marked degree. As far back as her recollection goes she declares that she was almost constantly tormented with hemicrania, sometimes more and sometimes less severe, but always on the right side. To get rid of this she tried an endless number of remedies, but always in vain. She remembers that at Frankfurt she took anti-pyrine, micranine, phenacetin and morphine, but always without any result.

She menstruated at seventeen, married at twenty-one, and has had one son, who, like herself, suffers from hemicrania.

She has passed a good number of the years of her life in different asylums in England, America, and Germany.

Her first nervous troubles go back to 1876 or 1877. What their nature was I cannot clearly say, but it is certain that her medical advisers told her to go to Spa. While there she received letters from her husband

every day, but one day she became convinced that she had never heard a word from him, and she telegraphed to him to come to her immediately.

In 1882 for the first time she entered an asylum in London. She was under the impression that she had received a letter announcing the death of her sister, and nothing could convince her to the contrary. She put on mourning, and commenced to do hundreds of strange things. Among other whims she had an excessive and irrational fear of filth, and would hardly touch anything at all. She was continually having her furniture changed, and she insisted that it should be dusted every minute.

She left the asylum after a stay of three months, in order to go to America along with her husband, who had business to transact there. Shortly afterwards, in 1883, she was admitted into one of the State asylums, where she remained for eighteen months. She does not remember what it was that caused this new detention, and she recollects nothing of what she did or what happened to her during that time.

A third time she was received into an asylum at New York, where she remained from 1885 to 1889. It seems that there she was confined to bed for two years, 1887 to 1889, on account of a surgical affection of the genital organs, for which she was operated upon. For a long time she would take no food except a very small quantity of milk, and the weight of her body fell from 136 to 66 pounds. She remembers that during her stay in that asylum she was fed by force, and that she refused nourishment for no other reason than lack of appetite. According to her story, Dr. T., the medical superintendent of that asylum, tried to hypnotize her in order to cure her of anorexia. To that attempt, which had no curative result, she attributes a great part of the troubles that have since afflicted her. In June, 1889, she was transferred to another asylum.

In April, 1890, she regained her liberty and returned to Europe, going to Berlin. She was well, and lived with her husband until 1893; then suddenly she was seized with hallucinatory disturbances. At that time she was still under the influence of a great impression produced upon her through reading, whilst in the New York asylum, a book by Stevenson, in which there is a story of the transformation of one person into another, and accounts of many other strange phenomena. It is quite certain that one day she thought she saw her husband hanged, with a noose around his neck. She was in great despair, and soon afterwards left for England to join her sisters. There she was admitted to one of the London asylums, where she remained six months, until October, 1893.

When she recovered her liberty she learned of the death of her husband. Then commenced a new Odyssey for our patient, not from asylum to asylum this time, but from country to country. Between October, 1893, and June, 1894, she visited more than fifty towns. She constantly heard a voice speaking in her right ear, ordering her to go here and there, and that voice she had perforce to obey. 'It is Dr. T.,' she asserted, 'who is amusing himself by tormenting me in this way.'

Finally, about July or August, 1894, she reached Frankfurt, and was confined in the asylum there, where she remained until August, 1895. At that time she was absolutely convinced that she had contracted a second marriage with a certain Enrico Bertrand, altogether an imaginary person. She cannot say how that conviction arose, but it is certain that she was so sure of it that in the asylum she gave the name of her presumed husband. She still remembers that one cold day in December, 1894, when she was admiring the new-fallen snow, she heard the customary voice, which this time bade her hang herself. She was carrying out the order when a thunderbolt fell (this is an actual fact, as I had afterwards

occasion to ascertain), and she thought that she had a vision of the Madonna. She swooned, and was unconscious for more than two hours.

In the asylum at Frankfurt she won the love of all, and gained so much sympathy from the superintendent and his wife that she was allowed very great liberty. One fine day she took advantage of that and made her escape. Then she resumed her wanderings, always persecuted by the voice that continually ordered her to go hither and thither. One day, at the end of September, 1896, when she was in Palermo she felt a very curious sensation, starting at the root of the nose and running to the right temple, accompanied, according to her account, by bleeding. From that time her hemicrania and her hallucinations disappeared.

Finally she reached Naples about October 4, 1896. While there, one day she lost in a carriage her pocket-book, containing a very considerable sum. In the evening, having gone to dine with a lady friend, she was questioned as to the reason of her dejection, and she related all that had occurred. Thereafter she accepted the sum of 500 lire which that friend was good enough to offer her by way of loan. To her unbounded astonishment, she learned one day that she had been accused of fraud, and she found herself in the prison of Santa Maria Agnone.

Could this be another version of the story that formed an accusation against her? It will be seen that it differs very markedly from the account given by the Questor and from the complaint lodged by Madame A.

From her childhood our patient has occupied her mind with serious study, finally graduating with the degree B.A., within a few months of obtaining which she married. In addition to mastery of the English language, she knows German very well, French well, and Italian and Spanish moderately. She has learned a little Latin and Greek, and the elements of the various sciences. She knows music also, and she is a player of the pianoforte. She writes shorthand.

In 1883, while in America, she commenced writing some pieces of poetry and articles on the woman's question. She was then in an asylum, and the manager of the *Utica Herald*, who had a sister an inmate there, got these into his hands and published them. Thereafter, in the year 1892, she published two novels. The first of these is rather a study on the education of children than a novel, the idea that the author wishes to develop being that the first duty of parents is to attend themselves to the upbringing of their children. It treats of parents who think only of science and philosophy; of a mother who, in order to imitate her husband in his study of those subjects, which was certainly out of place where there were children, entrusted everything to a governess, who, however, was very good and well educated.

In the second story the author wishes to prove that it is the duty of every woman to extend a pitying hand to her lost sisters. She is at present writing a new work, in which she intends to deal with life in asylums.

It is difficult to affirm whether these two books, which she claims to have written under a pseudonym, are really her work. The style appears to me to be hers, and no one can deny that she has the ability to write them.

I thought well to apply to the superintendents of the asylums of which she had been an inmate in order to get a full account of her, and the information thus collected has been compared at all points with the story that she herself told me.

I applied to the superintendents of the London asylums, requesting information about Madame S. They replied that they knew nothing of her, and that was confirmed by a polite letter sent me by the chairman

of the Lunacy Board. When I reproved her for giving me false information she showed no discomposure, but said that I had made a mistake in asking about her under her paternal name S., because in the London Asylums she had been received under the name of her husband B. I wrote again, and received precise, although short, notes, in a letter dated April 4, 1897, in which I was assured that Madame B. had been in prison and in asylums in America; that she had presented phenomena of depression, auditory hallucinations, and grave menorrhœa. All that arose upon a basis of hysteria.

The letter that Dr. S., Director of the Frankfurt Asylum, kindly sent me was much more detailed. He states that Madame Luisa S. Sybilla Be., *née* S., widow B., was received into the Frankfurt Asylum on August 31, 1894.

Before her admittance to the asylum she had been in prison on suspicion of a great robbery of jewels. Inquiries made by Dr. S. brought to light the fact that the name of Be. was false; that she was simply Madame B.; that a sister of hers had committed suicide; that in 1883 she had committed a theft, and had been declared insane by experts; that she had been an inmate of a certain United States asylum from May to October, 1883; of one New York asylum from September 17, 1885, to June 27, 1889; of another from June 27, 1889, for a period of unknown duration; and from October 13, 1893, she was again an inmate of a London asylum. From information that Dr. S. had collected from the superintendents of those institutions, it is certain that Madame B. was received into them with phenomena of pronounced morphinism, and suffering from affective states of depression, with anguish and a tendency to suicide.

There is nothing notable in the way of degenerative anthropological marks, except that the lobules of the ears are adherent, and that the upper and lower teeth are prognathous. An examination of the organs showed nothing noteworthy.

She still menstruates, and sometimes the menstruation is of abnormally long duration. She suffers great pain in the hypogastric region (perimetritis), and for some time after menstruation ceases she has an abundant flux from the uterus and the vagina.

Her general nutrition has become rather defective. The weight of the body on January 8 was 99 pounds. There is marked hyperæsthesia, also anæsthesia.

There is hypersensibility to painful stimuli, even though they be slight.

All movements, even delicate ones, can be made with the eyes shut. She can detect more minute differences in weight than the average individual.

She has exact perception of the four fundamental tastes, both on the front half and on the back half of the tongue.

Her power of vision is normal, and her sense of colour is also normal. The field of vision of both eyes is restricted.

She has suffered for a long time from hemicrania. At present from time to time she complains of pain limited to the upper part of the head. During atmospheric changes she is sometimes more melancholy, but at other times more excitable and irritable. Her kinæsthesia is usually depressed. The cutaneous reflexes are normal. The vessels of the head are very prominent.

Since she has been received into the asylum we have never been able to discover in this lady any anomaly at all that is worthy of consideration, or that possesses any semeiotic value for the diagnosis of an abnormal psychic condition.

She was perfectly conscious of her state, of her new conditions of

life, and of her new relations. From the first moment she fully understood her position as an inmate of an asylum, and although she did not like it, she adapted herself to the discipline of the establishment and to the monotony of the life that is led there. She was not accustomed to the food that was given to the inmates in general of the establishment, and as we have no boarding arrangements at Sales, she suffered much, particularly for the first few days, on account of the food, which, from previous habits, was certainly not suitable for her stomach.

However, she besought the matron so nicely, and she was able to gain her liking to such a degree, that the latter consented to allow her to eat at her table. That was done with my permission, while the matron also had some more delicate food prepared for her.

Nothing has escaped her from the first day of her admittance into the clinique—neither positions nor names of the nurses, nor the doctors, nor their attitude and their bearing towards herself and the other patients ; nor the psychic states and the tendencies of the inmates with whom she was obliged to remain in contact for some considerable time. As she found some difficulty in expressing her ideas to others, particularly to the nurses and to the matron—for it was not possible to converse in French or English except with the medical superintendent and one or two of the doctors—in a little time she learned both Italian and the Neapolitan dialect sufficiently well to answer her needs, in so far as the immediate requirements of everyday life are concerned.

Her speech is always logical. She is never caught in a contradiction, in any strangeness, or in incoherency. She judges men, things, and events as a woman of culture and astuteness might judge them—with equity and with keen acumen. She never makes gross mistakes.

There is no need to direct her attention to things and acts, for nothing escapes her wide perspicacity.

Her memory is ready and faithful. To prove that, it is sufficient to state that she can relate, in due order and with proper connection, all the episodes of her life. It was she who gave me the names of the asylums of which she had been an inmate, of the cities in which they were situated, of the doctors at the head of them, and the dates of her admission and dismissal. It was on her indications that I wrote and got answers from the various superintendents of the asylums of which she had been an inmate. She had forgotten nothing—none of the episodes nor even of the anecdotes of the whole of her normal life, and that applies both to the most remote as well as to the most recent occurrences.

A proof of her intelligence is to be found in the written document that I invited her to give me, containing a succinct history of her life. She wrote the seven sheets in a little over two hours, without ever repeating herself or placing a single word wrongly ; and she was wonderfully accurate as to names of men and of places, as to dates and events.

Her affections and sentiments showed absolutely no trace of anything abnormal, except emotiveness. On the other hand, this lady shows quite uncommon fineness of breeding.

Loud speech, roughness on the part of any one of our female hospital attendants, who are recruited from the lowest social strata, or ungentle treatment of any of her companions in misfortune, however unruly and aggressive the latter may have been, produces in her real suffering, and she does not hide her resentment either from the doctor in charge, from myself, or from the matron. Suffering in others touches and moves her. She has often reproved, in the most ladylike fashion imaginable, a hospital attendant for some rudeness offered to herself or to one of the other inmates. One day she heard the doctor of her section, to whom she was giving lessons in English by way of recreation, make use of a phrase that she considered not quite proper, and she stopped all inter-

course with him, even the English lessons. That was done not from pride but from the disgust that an action that appears to her discourteous, whether directed against herself or others, always produces in her. I got the matron to take her into her confidence, and I allowed the patient to eat at her table in order to put her to the test, and she has always behaved with the greatest delicacy. She has never lied, nor has she ever repeated what she has noticed with the intention of making mischief, and she has never appropriated anything that did not belong to her. She is always affable, always anxious about the misfortunes of others, always willing to do something.

She is respectful, correct, and disciplined. Certainly she has not adapted herself to the exigencies of asylum life, but she has suffered with resignation, and only just lately, when she has been weary of suffering and uncertain as to her fate, has she sometimes broken out into complaints. At other times she has assured me that she would prefer to end her life rather than continue in this way for a long time. However, these outbreaks have no pathological character; on the contrary, there is a sound reason for them.

She passes her time in reading, sometimes in writing, and sometimes in domestic work. Very rarely is she to be found idle.

To sum up the case, we have found on the somatic side a figure of subdegenerative type, especially if she be contrasted with the constitution of the Anglo-Saxon woman. On the intellectual and moral side, when in her normal state, she is a woman of sound culture and of strict upbringing. Her sentiments are fine, delicate, social, humane. She is free from the feminine love of tattle, and is unstained by the pornographic sense of words and by ambiguous behaviour. On the other hand, her emotiveness is truly exaggerated and diseased. She easily represents to herself ideas and images as truths, while there is an exchange of thought for reality and real duplication of the personality, with change of disposition, tendencies and conduct—a true psychic dispolarization. In these states of duplication, some of which are represented by gaps in her history, she committed the offences with which she has been charged.

*Hysterical Stupor, with Stereotyped Poses, of Sexual or
Hypochondriacal Nature.*

In the cases belonging to this group the field of intellect is closed, and the affective sphere is almost entirely obliterated. Past emotions, of greater or less intensity, and usually excited by sexual episodes, bring about the attitude associated with those episodes. There is a species of mental catalepsy, during which there is vividly recalled the infantile age at which occurred those events that furnished a new spiritual product capable of overthrowing and arresting all movement in the mental field. During this condition of mental catalepsy the age at which the episode and the pose occurred are remodelled, even though it be many years later, and some chance circumstance may bring this about. In other cases it is the anomalous or false kinæsthetic sensations that bring about constriction of the field of intellect and of the affections—hypochondriacal *monoidism*, or *monotonia*, with strange poses, stereotyped or mutable.

OBSERVATION XI.—P. L., eighteen years old, belongs to a weak family not free from psychopathic taint. He is by no means remarkable for intelligence. He went to school without profiting much therefrom, and

he never succeeded in learning any trade. He does not appear to possess ordinary keenness of observation and of judgment. Two months before he was received into my clinique he presented a strange bodily attitude, the neck and upper part of the spine being inclined forward, the pelvis also forward, and the middle part of the spine curved outwards. This pose recalled the masturbatory attitude, but was greatly exaggerated. At the same time there was a kind of stupor, with marked slowness of perception and incapacity to understand questions, these being answered slowly and inadequately.

On objective examination, the tactile sensibility was found to be unaffected. The sensibility to pain was much diminished all over the body, and particularly so on the inner aspect of the thighs. There was a slight concentric restriction of the fields of vision of both eyes.

A careful psychological examination revealed a dream-like state, in which he was almost completely abstracted from reality. He hardly ever managed to grasp the meaning of what was said to him, and he could not form any judgment upon persons, things, or circumstances. The asylum, the doctors, the hospital attendants, and patients with severe illnesses passed for a long time before his eyes without his taking any notice of them or being able to identify them. There was no sign of hallucinations or deliria, and no impulse whatsoever. He had every appearance of being in a pose that had been protracted for weeks and months, and one which was without any active content, either ideative or emotive.

Suggestive treatment with strong shocks of static electricity and energetic commands was adopted. The effect was rapid. In a short time he resumed the upright position, and his mental field also became clearer. He was discharged recovered.

OBSERVATION XII.—B. L., aged twenty-two, was ill for about two months before his admission to the clinique. It was following upon intense emotion when he was already reduced, very probably by onanism, that he fell ill. His tone is hypochondriacal. When admitted he was shrivelled and contracted, his limbs being rigid and his eyes closed. To the many questions put to him his only answer was, 'I am paralyzed.' When put to bed, he will generally remain rigid, his eyes closed, while his hands assume the strangest positions. If he is obliged to get out of bed by some energetic order, he presents the classic form of *astasia-abasia*. Sensibility appears to have been lost, for it is difficult to obtain any response from him; there is reaction to severe pricks only. The muscular nutrition and the deep and superficial reflexes are normal. He stays for whole days in bed with his eyes closed, and with the upper limbs more or less stiff and rigid. He drinks his milk and eats his macaroni; he is indifferent to everything that goes on around him, and he is preoccupied with his paralysis, to the exclusion of all else. His attitudes are caused by a real *monoidaism* like a fixed idea. After he had been in the clinique for a few days he had lucid intervals, during which one could talk with him. The psychological examination made at that time showed that all the elementary processes of the mind—perception, attention, memory, and ideation—were poor and flaccid. There was no qualitative disturbance of the perception. He showed complete indifference to his family and to other people. He made great ostentation of his illness, and tried in every way to interest the hospital attendants and the doctors in his sufferings. He was utterly incapable of thinking of anything else, and it was impossible to turn his attention to any other subject.

Suggestive treatment was adopted in the form of static electricity discharged with strong sparks, and energetic orders. This brought about a rapid and progressive improvement, during which one could note the enlargement and the recomposition of the psychic personality in propor-

tion as the contractures and the astasia-abasia disappeared and the sensibility returned. That happened in a few days.

Fourteen months after he had been dismissed from the asylum, completely cured, he was readmitted in a condition of stupor very like organic stupor, with alternations of psycho-motor agitation. He refused food, and from time to time had an impulse to attack other persons. It is not improbable that the malady assumed this form owing to unconscious imitation, for in our hospital there are very numerous cases of stupor, of sensory delirium with psycho-motor agitation, and of dementia præcox. It was noticed, however, that when our patient was not watched he would quite readily eat more than his share of the rations; and, facilitating the diagnosis, there was a contracture of the right lower limb on the pelvis.

For the second time, he improved in the asylum, so that at the beginning of June it might be said that he had entered on convalescence. One morning, after I had strongly reproved him for the theatrical parade of illness and for his unwillingness to work, he was seized by a convulsive attack, with impulses to violence. Still, that did not retard his cure, which was rapid and complete.

I was not in time to take the photograph of this patient, but I give here that of another youth, who, consequent upon strong emotion, had been for a month in the pose that is photographed. He also showed muscular rigidity and great resistance to passive movements, while there was a notable degree of stupor, closely resembling katatonia. All will power was extinguished, and he had much the appearance of a person fascinated. This pose also reminds us of a sexual attitude.

The facts hitherto collected show, on the one hand, the parallelism between somatic and psychic phenomena of hysteria, and, on the other, the great disturbance of balance of the psychic activities, which, like waves, rise to a great height, only to fall again to a level much below that of the physiological oscillations of the mind. The hyperæsthesia is concomitant with greater perceptive power, limited to the hypersensitive sense, whilst the anæsthesia is generally accompanied by a depression in tone of the activities of the personality, and sometimes even by abolition of all mental activity. The increased perceptive power of the hysterical subject is not utilized by the mind, which is incapable of high products, and not well adapted for the formation of stable syntheses, which are always the expression of a strong mental organization.

This being so, it seems to me needless to discuss the question of the existence of hysterical insanity. To assert that hysterical insanity is nothing more than a form of hereditary degeneration, as Joffroy maintained at the Congress of Clermont Ferrant in 1894, or to bring up again the whole question of the psycho-pathology of hysteria, would be to disregard the importance and the value of a great number of facts, which, through the great variety of forms that they assume, afford evidence of a psycho-pathological disposition which will always serve as a guide in the classification of the clinical forms that we are discussing, and in the constitution of a group that must, and ought to be, recognised under the name 'hysterical psychosis.'

Whatever Féré and Pitres may think, we hold, along with Regis,

Mendelsohn, and others, that hysterical insanity exists *per se*, with its own quite special characteristics. It assumes the most diverse forms, but these may be traced back to cessation of the functions of more or less extensive zones of the cerebral mantle, with restriction of the field of consciousness of the personality and preponderating power of the subconscious. The latter invades the field of the consciousness, and in emotive and hypersensitive persons is met by no obstacle, so that the new guest, whether external or internal, finds the components of the personality, not well organized originally,

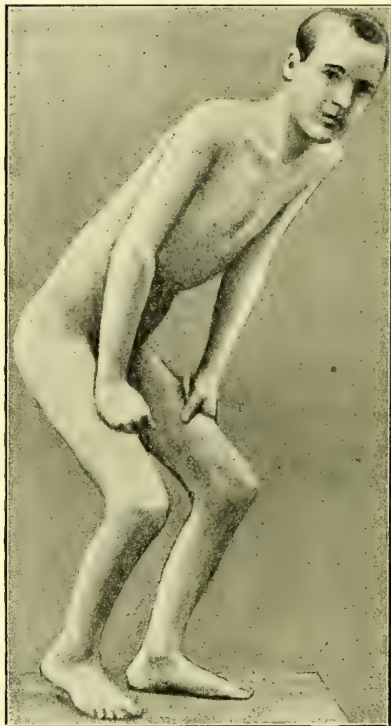


FIG. 76.—A KATATONIC STEREOTYPED POSE IN A HYSTERICAL SUBJECT.

ready to place themselves at its service. This gives a new content to, and impresses a particular emotive colouring on, the personality. The facility with which the content of the consciousness, for insignificant internal or external reasons, appears and disappears, gives the hysterical subject the character of mobility, and makes her appear capricious, violent, bizarre, criminal, or generous. If I had to sum up the psycho-pathological idea in one phrase, I would say that the hysterical subject has an infantile mind, but sexually is adult and anomalous. Thus it is that she, like an undisciplined child, is mobile, capricious, and astute. She obeys the craving of her instinct for pleasure, which has perhaps been perverted, and endeavours to elude the vigilance of her guardian to procure pleasure for herself. With childish thought-

lessness she falls in love with the first man that casts a look of desire upon her, and she will leave her young husband during the honeymoon in order to abandon herself to a sexual orgy with someone whose name even she does not know.

A patient recently placed under treatment in my clinique said to me: 'I love my husband, I like to see him, and I wish him well. I love my children, too; but many a time I have been the victim of my fancy. I readily turn aside to pursue ideals, and when I think I see any of my ideals embodied in a man, I have not the strength to control myself. I abandon home, husband, and children, staying away two or three days at a time. Then I see

that this state of things can't continue, and either I return home or they come and fetch me.'

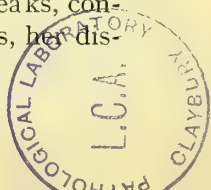
Thus, exalted fancy offers the hysterical subject a field of action with no obstacles. The primary affections, the fundamental ideas that have such a large share in the guidance of conduct, and the ethical sentiments which, in the case of the strong, form an insuperable barrier to the assaults of instinct, abandon the field of consciousness, with the result that the hysterical subject thoughtlessly pursues the object of the moment.

It is certain that hysterical insanity is taken advantage of and abused. In practice there is great confusion, and distinctions are quite arbitrary.

One form of hysterical insanity that admits of no discussion, and which is of hallucinatory content, is the form accompanying the phase of passional poses (Charcot), following a more or less violent and prolonged attack of grand hysterical convulsions. After the phase of contortions in the grand attack, the subject, generally a woman, poses in the most extraordinary attitudes of religious ecstasy, of pain, of fear, of love, of tenderness, or of wonder. She sees her lover and yields to him, or she hears music, enthralling music that sends her into ecstasies. She will sit on her bed with her elbows on her knees, her fingers entwined in her hair, her face between her hands, her attitude revealing profound affliction or extreme despair. She turns her eyes to heaven, completely abstracted from the world of reality. She talks with mystic personages; she walks slowly, enveloped in an air of mystery, etc.; or she will remain in a lethargic state for hours at a time, eyelids drooping and tremulous, her eyes turned convulsively upwards. This condition suddenly ceases, leaving no memory of itself. The consciousness is completely re-established, if we except the abnormal character that remains, more particularly in those exhibiting grave marks of hysteria; but the patient relapses into the same state, *almost always at the same hour*.

Sometimes, instead of the passional attitude, there is a state of intense psychic exaltation. The patient is a prey to strong excitement, of various content—painful, threatening, erotic, hilarious—with weeping, laughter, and mysterious or obscene language, hallucinatory visions of beasts, and states of terror. There is agitation of the limbs, the pelvis, or the head, sometimes with true, recurring, rhythmic spasms. Characteristic of these states is the rapid establishment of periods of remission, during which the personality is completely restored, and that almost instantaneously, only there is equal facility in the relapse into the former psychosomatic agitation or state of lethargy.

Another form is spontaneous somnambulism, during which the personality of the subject is completely changed. She speaks, converses, and acts in an ordinary manner; but her affections, her dis-



position, and her habits are changed. When she returns to her original condition, sometimes she remembers nothing of all that she has done in her altered state, at other times she remembers and recounts her visions. Such a condition of matters may last for moments, days, weeks, for many months, or even for a year or so (see Part II.).

Occasionally the hallucinatory form is recurrent, and of very simple content—a sort of sensory tic. A young woman who was under my treatment had a hallucination of a *black man* who entered her room by the window, and this recurred eight to ten times a day, almost always at the same hours. All of a sudden, during a conversation, she would give a cry of terror, and fall into a state of lethargy, from which she recovered in thirty minutes or an hour. This state of matters lasted about four months, notwithstanding the treatment.

Sometimes there is a so-called attack of sleep that may last for days or for a few weeks. During that time many organic functions are depressed, and the patient neither eats her food nor passes urine. It is difficult for even the most skilful medical man to awaken a subject in this condition.

Years ago Professor Senise and myself saw a young woman of about eighteen in an attack of sleep that had then lasted a fortnight. During that time she did not eat or drink, and she passed urine only three times. It was only by applying a strong current of faradic electricity to the vagi nerves that I succeeded in reawakening her. She at once resumed her ordinary mode of life, although she complained of extreme weakness. She awoke with a spirit of hostility to me, and she rudely and contemptuously rejected my proposal to treat her by means of hypnotism, in order to release her from a malady that deprived her of her liberty and caused great alarm to her poor parents. Two days later she came to my house all smiles and compliments, declaring that she had unlimited confidence in me, and offering to make a start with the hypnotic treatment (hysterical contradiction).

Hysterical melancholia, mania, and paranoia have been described. Schüle, whose clinical acumen is well known, has given a brief description of these forms, and many others have followed his example (Mendel, Krafft-Ebing).

In hysterical mania there is sometimes a rapid transition from the hypochondriacal tone of mind connected with the altered kinæsthesia, particularly pains in the ovaries, knots in the epigastric region, and constriction of the throat, to a feeling of relief and well-being, with merry and joyous tone, great facility of speech, coquettishness that is full of wit, and an unusual and thoughtless translation of ideas into the corresponding acts. Walks, visits, dressing, and to some degree overdressing, festivities and theatres, now form the main preoccupation of the subject. Her own family have little

place in her thoughts, and she breaks up its quiet habits. The sexual instinct is heightened, and more impulsive, so that she abandons herself more easily and more frequently to amorous suggestions.

The sense of lightness gives the hysterical subject a certain restlessness, just as the sense of well-being and vital power makes her intolerant of reminders or correction, which she sometimes contemptuously resents. At times she will break out into fits of fury of short duration, with threatening cries, rebelliousness, acts of violence, and tendency to destruction. At other times this agitation partakes more of an infantile character, and then the hysterical subject weeps, cries, refuses to eat, and rolls on the ground. In these cases it is by no means rare for a convulsion to close the period of mania, after which either the subnormal state proper to the subject is re-established or the personality comes out of the convulsion under another form.

In contrast to the constancy of genuine mania, we find characteristic of such maniacal states an unusual variety of phenomena—the signs of hysteria, the transitory return of hypochondriacal ideas awakened by painful sensations, and the convulsions that occur and recur during the course of the malady.

Hysterical melancholia is specially characterized by behaviour significant of pain, but almost never intense or profoundly felt or identified with the ego. In most instances it is easy to discern in hysterical melancholia only a very superficial degree of suffering, notwithstanding the fact that the patient tries in every way to heighten the effect and to draw upon her ‘pains’ the pitying attention of friends and relatives. The dark feeling of haunting and obstinate suffering that invests the mind of the melancholia subject and drives him to despair is lightened in cases of hysteria by the pleasure that is derived from the sympathy of others with the sufferings of the patient, and by a vague hope of getting free from the ‘terrible pains.’ The mind of a melancholic hysterical subject never reaches that degree of actual and profound abasement which in the case of melancholia sometimes extends to the negation of one’s proper personality. As a matter of fact, suicide is rare. Here also the personality is found to be duplicated. The pain is only on the outside of life, and from behind the curtain the other aspect of the hysterical personality peeps out from time to time. Under the influence of impressions or emotions the melancholic mask is dropped, and the subject reappears in her original and natural figure.

Hysterical paranoia is even more frequent than mania and melancholia. It assumes various forms, the most common being the religious and the erotic. In the first case we find visions of saints and religious ecstasy, whence paranoic ideas spring up, ranging from the most rudimentary to the most highly developed.

Hysterical mysticism, which is associated with rudimentary paranoic ideas of a religious nature, leads to ascetic conduct, with a tendency to theatrical display. In more serious cases real delirious ideas appear, being determined by hallucinations or by dreams of religious content. These give classical paranoic syntheses, and of them an example is found in the story of Joan of Arc (Ireland). In almost all subjects of this second category we find hysterical blemishes, particularly anæsthesia, analgesia, and rhythmic spasms.

Erotic paranoia also assumes various forms—the persecuting and the erotic properly so called. The first manifests itself in jealousy. There is predominance of exuberant egoism, tyrannical and indomitable. The poor man who falls into the net of the hysterical jealous woman is three parts lost. She shadows his steps, allots the hours of his absence, sometimes follows him to the office, lays wait for him in the streets, sends spies after him, watches his every movement and every look that he casts at any person with whom he has an appointment or with whom he chances to be in contact. False interpretations are frequent, also illusions, or simply illusionary interpretations of the most innocent phrases; and in such a case, which occurs quite frequently, the family is treated to violent scenes of crying, insults, threats, and blows, of which the poor husband is the victim. Neither entreaty, loving behaviour, nor prudence is of any effect in calming the diabolic spirit. After some time hysterical convulsions will perhaps supervene and close the scene. In more serious cases the delusion takes the form that the women or ladies of the neighbourhood are trying to attract the husband to themselves. The subject already notices that they are casting languishing glances at him, and that they look on her with jealous eyes, no longer treating her as before. Cordiality and courtesy are reserved for her husband alone. She has already heard various loving expressions pass between them (illusions), and so she threatens and insults her poor innocent neighbours, who abandon her to the most miserable solitude. Some such women force their husbands to frequent copulation, not so much from libidinousness, for often subjects of this class are very little addicted to the pleasures of love, but rather to exhaust the energies of the unhappy man, so that it may be impossible for him to have sexual relations with other women. And when the poor man cannot or will not, the wild scenes of weeping and crying, threats and petty insults, are renewed. Not a few cases of loss of virility are due to wives or mistresses who are hysterically jealous.

This state is interspersed with periods of endearment and loving behaviour (hysterical contrast), or it may be subcontinuous and aggravated during menstruation; or, again, it may be recurrent at the menstrual periods. This last is the most frequent form of periodical insanity in women.

The second form comprises those women who, with minds originally ruled by erotic ideas, either restrict themselves to the domain of the ideal, and are the platonic dreamers of love, or become in some cases the persecutors of men who have had the misfortune to come in contact with them; for they resort to wheedling of every sort, breathing forth sighs, sending flowers, and writing long love-letters when they are about fifty. In most cases they refuse copulation.

The erotic idea sometimes descends to the level of instinct, and becomes confounded with it. In these cases the sexual sensibility is intense, the appetite is keen, and almost always unsatisfied. A species of sexual erethism subjugates the personality, overcomes it, and rules it periodically. A feast leaves her unsatisfied, and pleasure polarizes her mind. A husband or a lover will not satisfy her unbridled lust, and the first comer is accepted as a companion. Neither shame nor the honour of her house has any influence over her—from master to servant, in the bedchamber, the boudoir, or the stable—for the brutal instinct will suffer no restraint. All the products of civilization, honour, and decency, lose their value for hysterical subjects of this class (nymphomania). This condition also is mutable.

Cases of hysterical persecutory paranoia also occur. I give below a short summary of an interesting case.

OBSERVATION XIII.—C. M., elementary school teacher, was sent to the Naples asylum in August, 1902, from the criminal asylum of Aversa, as he had been guilty of homicide. For some time previously he had been manifesting a notably psychopathic constitution, characterized by suspicion and tendency to isolation, and these features had gradually become very much accentuated. Things reached such a point that one day, finding the servant girl, who was also his mistress, speaking with strangers and the door of the house open, he believed that he saw in that a proof of a preformed design to rob and murder him, and, snatching up a razor, he killed the girl.

On inspection, he showed no anthropological marks of degeneracy. Examination of the functional organs showed complete hemianæsthesia of all forms of sensibility on the left side, with hyperæsthesia and hyperalgesia on the right. The senses of smell and of taste on the left side were gone. There were hemianopsia and deafness; hemiparesis on the left, including the upper part of the face; bradyphasia and bradyphrasia with extensive amnesia, and agraphia.

The patient has an ordinary physiognomy. He appears unsusceptible to the stimuli that reach him from the outer world, nor is it evident that his abstraction from the influence of his surroundings is the effect of concentration of the psychic activity on the products of a diseased inner life. He retains elementary perceptions, and recognises places and persons perfectly, especially after they have been pointed out to him. He knows that he is in an asylum, not because he has derived the idea from the synthetic judgment of what he has perceived in his new surroundings, but because he has heard it repeated by others. His own perceptive power is much reduced in comparison with what it must have been previously, seeing that he was a teacher in an elementary school.

The power of memory presents the most considerable disturbances.

The whole of his life up to the date of his admission into the asylum of Aversa forms a vast gap in his memory. He no longer knows that he was once an elementary teacher, and in the same way he remembers nothing at all of the crime with which he is charged. We can measure approximately that enormous loss of recollections, and we find it extending also to the sensory and ideative regions. Almost all the images of places have disappeared. This man, who has passed a good part of his life in Naples, and who should be able to indicate the streets and squares of that city, is not mentally capable of following out any single itinerary whatsoever. Almost all the images of persons are forgotten. A brother of his, a priest, came to visit him, but was not recognised by him. The only surviving image of a person is that of another brother who visited him at the time when he was received into the asylum of Aversa. The images of common objects are also lost in great measure. He lived in a maritime city, yet he no longer knows what a ship or a boat is. Leaving the sensory memory, we find that the patrimony of abstract ideas has become extremely impoverished. To give an example, this one-time teacher in an elementary school cannot even tell what a school is.

The defects of language are particularly classical. Besides losing a great number of the substantives that apply to abstract ideas and concrete objects, and in addition to the loss of the fluent use of phrases formerly at his command, and that, moreover, to such an extent as to force him in most cases to make use of colloquial expressions, he has completely forgotten how to read and write. If he is asked to read a book or a newspaper he is quite at a loss, and does not know what to do. Not only is he incapable of recognising a word as a whole, but he does not even recognise the separate syllables and letters. He has lost the power of writing spontaneously and to dictation. He can only copy, and that in the same way as would be done by a person reproducing lines that had no meaning for him.

A mere enumeration of the phenomena presented by this patient, whose history, the subject of a very interesting study by Drs. Patini and Mele, is reported in the *Annali di Nevrologia* for 1902, will prove the rarity and the importance of the case. It is rare because of the somatic phenomena, such as the facial paralysis and the hemianopsia, and important because it proves the connection that exists between the somatic and the psychic phenomena of hysteria, although that connection may be more or less strict in different cases. Whatever the objections that may be raised as to the origin and nature of the somatic phenomena, or at least some of them, particularly the hemianopsia, of which some other cases are known (Janet, Lannois, Fournier, Harris), having reference to hysteria, those objections are overruled by the modifications that were noted in the course of the malady, especially the rapid and complete disappearance of the hemianopsia along with the hemianæsthesia, and the gradual and proportionate return of the intellect and the capacities of the former psychic personality. After a long and careful examination, resulting in the diagnosis of a hysterical somatic syndrome, with return of the personality to its infantile form, and after the psychic treatment of this patient had been entered upon in the manner suggested by the nature of the disease, the reintegration of the personality was relatively rapid. Up to the beginning of December the syndrome had remained unaltered. On December 9 the patient began to read, spelling out the words. The tactile hemianæsthesia diminished, while sensibility was almost re-established in the forearm and in the left hand; the temporal hemianopsia on the right disappeared.

On January 27, 1902, the patient could read fairly fluently, and could also write to dictation, although with much difficulty. The field of his

memory was extending ; he could realize his present circumstances, and was commencing the reconstruction of his history.

On February 22 the hemianæsthesia was much reduced. The sensibility was normal at the knee, the groin, and the chest ; at all other parts it was much diminished, but not abolished. Simultaneously the ideative field was broadening and the psychic personality reconstituting itself ; but a great deal was still wanting for the complete restoration of the original character.

About the beginning of April the personality was almost completely reintegrated. The patient could give a detailed account of how he had killed the woman. One single gap in memory yet remained to be filled up. Still, he was like a person preoccupied, and prevented from using his mind by some tormenting thought that could not be formulated or represented, and, in the meanwhile, of the somatic phenomena there still persisted the arthralgia of the left shoulder-joint, and the paresis of the left upper limb. Towards the end of April all the somatic phenomena had disappeared except a slight paresis of some muscles in the upper part of the face, and at the same time the patient had been perfectly restored, no blank remaining in the history of his past life.

I give three specimens of writing taken from the account drawn up by Drs. Patini and Mele, and with the greater assurance because these facts were verified by myself during my customary visits to the patients in the clinique. The three styles of writing form graphic representations of three stages in the process of reintegration of this patient.

We know neither the pathological anatomy nor the physiopathology of hysteria. We do know, however, that no matter how frequent or intense the hysterical convulsions may be, mental decadence is not a necessary consequence. The return *ad integrum* is almost always instantaneous and complete. Everything goes to prove the existence of a chemical metabolism, with the formation of cohibiting substances from the nervous wave in some parts of the brain, and the speedy resumption of the atomic constitution of the cellular substance and of the nervous reticules, both intra- and extra-cellular. These changes, which may be compared also to the isomeric states, are compatible with the life and the fine structure of the cells and the reticules, so that these resume their original function, even after a long interval, just as a normal electric apparatus would do when the current is given access to it.

It is certain that if the neurone doctrine had not been shaken to its foundations by recent histological researches, one of the best applications of it would have been that made by Lepine in the interpretation of the phenomena of hysteria. Given the amoeboidism of the ramifications of the protoplasmic prolongations and the necessity of the contacts for the passage of the nerve-waves (see Part I.), then our minds might rest content with an interpretation of hysterical phenomena as the expression of a tetanoid condition of the arborisations, impeding the passage of the nerve-waves, or an abnormal prolongation of some contacts, giving rise to that functional interdiction of small or extensive regions, cortical and infracortical, which is the preponderant and fundamental phenomenon of hysteria. But too much has already been said on

Io non so
 Io non so
 no malato
 n. no, solo
 come granchio

FIG. 77.—WRITING IN THE FIRST STAGE OF IMPROVEMENT.

Io sto meglio
 Io prima non sapvo scrivere
 e ora incomincio a ricominciare
 Carlo Moratti

FIG. 78.—WRITING AT AN ADVANCED STAGE OF IMPROVEMENT.

Il signor Carlo Moratti, insegnante d'arte nelle scuole
 municipali del comune di questa città

FIG. 79.—NORMAL WRITING, AFTER COMPLETE RECOVERY

the neurone doctrine, which formed a convenient explanation of so many things, for that doctrine is almost dead. Excepting traumatic hysteria, which is a complex psycho-neurosis, and leaving complications aside, we cannot speak of pathological anatomy of hysteria.

Ætiology.—Heredity, direct and similar, is the principal source of hysteria. The hysterical mother generally begets hysteria in the daughter, often aggravated by more advanced psycho-somatic degeneration. Neurasthenia, alcoholism, and epilepsy, are the neuro-psychopathic states that are most intimately connected with hysteria.

Education and surroundings have great ætiological value. All circumstances and conditions of life that interfere with contact with reality favour a frail mental constitution, with little resisting power. Given a predisposition to psychopathia, individuals with dreamy and fantastic natures, fond of contrasts and paradoxes, nourishing themselves on sensational romances, and finishing by seeking adventures or by failing to attach themselves to the realities of life in their own families and in their social surroundings, are those that are most frequently subject to hysteria, and more particularly in the case of women.

Labour, discipline, and the pressure of reality are good cements for the factors that make up a personality. A proof of this is found in the fact that in the army hysteria is very rare. An easy, indolent life and sensuousness are excellent contributors to hysteria. Mysticism and asceticism are thus closely bound up with the history of hysteria, because they withdraw people from reality, exalt sensuality, and allegorically they excite those combats between the intellect and the instincts, the victory always lying with the latter, which rush in from the subconscious after long repression, when the brain is most worn out and wearied with the long struggle and with onanism. Thus it is that nuns furnish by far the largest proportion of hysterical subjects. The enforced chastity, particularly in individuals endowed with fervid natures, exalts the sexual instinct to a still higher degree, and the hysterical convulsion serves to reveal the sexual trouble that has brought it about in most cases. Except in cases of infantile hysteria, the majority of hysterical subjects are over twenty-two years of age, worn out with desire and long expectation, without a ray of hope to lighten the sadness of the long despairing wait. The onanism to which they abandoned themselves in infancy, and often continue in youth and maturity, exalts the sexual desire and instinct; with all the train of phenomena of paræsthesia and malaise that prepare the ground for the irruption of convulsions under the slightest emotion.

In this regard not only am I inclined to accept the ideas of Freud as to the importance of sexual images that have passed into ‘the

unconscious' in the genesis of hysteria, but I may say that I have no doubt at all on the question.

The main movements and the contortions of the hysterical subject often present a sexual character, and the poses, such as that shown in Fig. 76, are nothing else than psycho-motor stereotypes, and often recall sexual attitudes.

Certainly the sexual instinct, precocious, perverted, or repressed, does not possess such genetic power in all cases; but an inquiry into this subject has furnished me with evidence of the greatest value as to the preponderating importance of the sexual life in the genesis of hysteria. The majority of hysterical women, in whom can be traced a genetic relation between the hysteria and insanity on the one hand and the ovaries on the other, suffer also from burning heat, prurient itching, or intense desires in the vulva and vagina, which sometimes compel onanism, and sometimes are the result of it. Very often it is these sensations that excite the convulsive attacks when they reach a high degree of intensity, as at the period of menstruation, and for some time before and after.

Strong emotions, contrasts, mental sufferings, disillusionments, economic ruin, loss of loved ones, are immediate and efficacious causes only when they act upon natures that are hysterical, either originally or by acquisition.

The reading of books dealing with spiritualism, presence at spiritualistic or hypnotic séances, and hypnotic practices, are good provocative agents; but the truth is that it is just those persons of hysterical nature who run after these mystical and emotional representations, and develop so strong a passion for them that they end by being their victims.

Physical traumata are a frequent cause of hysteria. These cases prove the existence of latent hysteria, which the injury brings into evidence.

Imitation acts in the same way, especially where the surrounding conditions are similar in point of age, sex, mode of life, and the dominating ideas or emotions in the whole society. It is in this way that we explain the numerous hysterical epidemics of the Middle Ages, to which the monasteries contributed such a large number. In later days we have also had examples of these in Italy and elsewhere. Palmer, of Riberach, mentions an epidemic of narcolepsy in a Catholic school, where thirteen girls between twelve and fourteen years of age were attacked.

In an institution at Rome a girl suffered from coxalgia as the result of a fall. Some time afterwards another girl, a companion of the first, and daughter of a neuropathic father who died of melancholia a long time afterwards, slipped in the same boarding-school, but did not fall. The next day she presented a syndrome closely resembling that of her companion, showing symptoms of coxalgia down to the smallest details. The resemblance to the syndrome

of coxalgia was such that the most distinguished surgeons in Rome and Naples were put to a severe test in dealing with the case. The discovery of anæsthetic and hyperalgesic zones in the two lower limbs, and the profound change of character in this girl, who, from being one of the best pupils in the school, had become capricious and crossgrained, revealed to me the true nature of the coxalgia. Perhaps the way was prepared by my conviction, frankly expressed in her presence, by way of suggestion, but, be that as it may, the girl recovered on being awakened one morning by martial music as the soldiers passed under the balcony of her house.

All debilitating maladies, anæmia, maladies of the sexual sphere, and troubles of the digestive organs, prepare the way for hysteria, which must always be regarded as a constitutional malady, developmental or acquired, consisting in the incapacity of the brain to maintain the psychic unity of the subject, and therefore the tendency to complete or incomplete duplication of personality.

Diagnosis.—The slighter degrees of hysteria are not easily diagnosed. They are lost in the large borderland between normal and pathological states, and are confused with characters which we generally look upon as normal, according to the particular national or racial disposition.

Some women are eccentric, original and mobile characters, yet they possess a certain immutable nucleus in their personality, and present no mark of hysteria; others are jealous and violent, but there are limits to the disorder, and they cannot be classed as insane; others, again, are eminently hypersensitive on the emotional side; still others are excessively romantic and fantastical, but their behaviour is correct, and they never fail in their duties to their families or their social obligations; whilst others, again, are very lascivious, but are kept within bounds by feelings of shame, decency, and duty. In all these characters we can quite well trace a real hysterical rudiment, but the diagnosis of true hysteria is founded upon the exaggeration of hysterical manifestations, upon the existence of convulsions, whatever their degree and form, upon the presence of hysterical signs—anæsthesia, analgesia, hyperæsthesia, hystero-genetic zones, kinæsthetic disturbances, restriction of the field of vision—which must be looked for in all parts of the body, and then those more classical signs—hemianæsthesia, paralysis, contractures, arthralgias, the semeiotic history of which could not fittingly be discussed here. For us equal value must be attached to those partial or total duplications of the personality, which range from simple change of character and of the affective tone to an altogether peculiar and different character, with or without amnesia, and to the ethical perversion of the personality itself.

This is not the place to discuss the differential diagnosis of hysterical and epileptic convulsions. Whatever be the form of

the hysterical psychosis, it is marked by the same mobility and tendency to disaggregation that characterize the hysterical mind. The description that I have given of it in the short sketches occurring in this chapter will serve as a guide for the recognition of true hysterical insanity as contradistinguished from those other forms of insanity that complicate hysteria, and each of which presents a clinical picture of its own.

Prognosis.—The outlook is much more hopeful than in epilepsy. Both these forms of neurosis are constitutional, each in its own particular way. In epilepsy there is an impediment to the free course of the nerve-waves. In hysteria the course is too easy and too free for these, so much so that zones of greater or less extent remain with a potential inferior to what is necessary to the conscious personality for the performance of its functions. In epilepsy, if the personality does not originally present the characteristic of destructive malignity, it will gradually acquire it; in hysteria, on the other hand, the personality assumes a theatrical character. The epileptic is eccentric in the sense that he reacts destructively, and he remains so; but the hysterical subject is egocentric in the sense that she takes pleasure in making herself a centre of interest for those about her, upon whom she reacts by her use of the wonderful and strange, serving up to her people a daily dish of troubles and annoyances, sometimes calculated to drive them to despair.

In the majority of cases this condition is only temporary. It is a fact, however, that although the fundamental character of both maladies remains unaltered, 90 per cent. of hysterical subjects are cured of those more classical manifestations that form the morbid syndrome, whilst epilepsy is rarely cured.

In my practice, which now extends over a considerable period of time, I have followed up the history of ladies treated by me for grave forms of hysteria, and have found that subsequently they became irreproachable wives and mothers.

Therapy.—The therapy will be understood from what we have already said when speaking of the symptomatology and the ætiology of hysteria.

Girls who are neuropathic, emotive, and sensitive, the daughters of hysterical mothers, should be brought up apart from the family. The upbringing ought to be kindly but strict, with no uncertainties about it and no compromises. It must be straightforward and sincere, and such as will not weary the mind, but keep it always within the confines of actual reality. There must be no sensational romances, no fantastic tales, and no exaggerated mysticism. Only so much religion should be taught as will assist in developing positive morals, and no more. Methodical muscular exercises should be practised to raise the physical tone of the personality.

Tonic and reconstituent treatment is advisable, with hydrotherapy and sea-bathing.

It is a duty to separate daughters from hysterical mothers, whenever possible, and girls whose minds are well balanced from a sister who is hysterical.

A close watch must be kept upon the manifestations of the sexual instinct, and upon outbreaks of passion against companions ; also upon the possibility of precocious and unnatural love, which enervates and perverts.

It is a good rule that a neurotic subject of this category should never assist in sickness, particularly in cases of accident and those that excite the emotions. Their sufferings should be duly noted, but on no account magnified, nor should any undue concern be manifested about them. Above all, the medical attendant should not suggest anything by asking the patient about phenomena that do not exist.

When the malady has developed, the removal of the sufferer from her surroundings is always one of the principal means of cure. In all cases the doctor must exercise great authority, but that need not prevent kindness. It must not be forgotten that the treatment is suggestive, and that the suggestion springs from his wisdom, from his authority, and from his conviction. No drug is of any use, for none could have any other action than that of suggestion. No drug that the hysterical subject has refused will act efficaciously, except perhaps an injection of morphine in states of superexcitation, in which case the physician must employ it with due restrictions and with prudence.

For a long time back I have been making as little use as possible of common hypnotism, for I am convinced that that is simply provoked hysteria, and nothing else, and I consider it both hurtful and dangerous as a means of treatment. The suggestion ought to spring from the mind of a cultured and authoritative medical man, and should be made when the patient is awake. When words do not succeed, certain other means of impression, such as electricity, and especially static electricity, may meet with success. The discharge of large sparks simultaneously with commands is very often efficacious with regard to the signs of hysteria, on the disappearance of which the personality is reconstituted. According to the case, there will remain latent hysteria in its various forms, but compatible with family and social life.

CHAPTER VIII

PARANOIA

THIS is a psychosis constituted essentially of a disturbance that is mainly intellectual, and through which the personality undergoes a slow transformation in its relations with the outside world. This metabolism of the personality is induced by false products of thought, which, although the logical process in the structure of thought is preserved unharmed, are assumed to be real, thus giving rise to alterations in the relations of the individual with his environment. The false products of thought, or the ideas of delirium, are not primary, as Westphal and Cramer thought. They have their root in the emotive nucleus of the personality itself, and they are developed according to the inexorable law of association between emotion and thought. It is certain that when a man accepts as a reality a false product of his own thought, the very fact of his doing so compels us to admit that there is a great anomaly in the formative process of thought and a serious defect of judgment; the mechanism of thought is subjugated by the emotions and the sentiments that are morbidly predominant. The abnormal emotive state, for reasons that are quite individual, either alters the process of synthesis in the formation of thought, so that the delirium appears to be primary, and not assisted, at least in the beginning, by sensory disorders, or it alters primarily the perceptive process, giving rise to illusions and hallucinations (see Part II.), and through the abnormal products of the perceptive sphere deliria are formed. The false ideas originated in this way (deliria), become assimilated with the conditions of the consciousness, to which they lend their tone, and an emotive and determinative character peculiarly their own. Those which are endowed with strong assimilative power induce a metabolic process, sometimes rapid, but more frequently slow, either total or partial, restricted to the present or retrospective of the whole intellectual patrimony of the personality, and they impress on the sensory function on the one hand and on the perceptive function on the other the work that serves for their further development, disintegrating the old per-

sonality and reconstructing a new personality of which they themselves are the essence.

We have said that false ideas, which are the outstanding feature of the psychosis that we are now dealing with, emanate from the emotive nucleus of the personality. The old supposition of Krafft-Ebing and Meynert, maintained also by some alienists in recent times, that these deliria are independent of an affective condition of the mind, is no longer tenable in view of modern criticism (see Part II.), and must be restricted solely to the signification that paranoic deliria are independent of maniacal exaltation and of melancholic depression. In all the better known and better studied forms of paranoia the emotions are the fundamental and primary fact.

It is the emotions that give the tone to the personality, and this idea, which I have been developing for many years in my clinical lectures, is also found in the publications of Grimaldi and of Del Greco, while it has been fully developed by the school of Tamburini, particularly by Ferrari (*'Influenza delle emozioni sulla genesi e lo sviluppo dei delirii,'* etc., *Riv. Sper. di Fren.*, 1901).

In paranoia the fundamental emotions, which are also an expression of the altered kinæsthesia, are emotions of a primitive character, such as suspicion, vanity, pride, and fear—fear of injury and destruction, desire of exaltation and of grandeur of one's own ego. Therein lies the reason of the egocentric attitude of the paranoic subject (Specht). These primitive emotive states, intrinsic to the personality and proportioned differently in different men, determine currents and orders of ideas and actions in the evolution of the personality, which succeed, in various ways, in protecting or expanding the personality in a rigorously logical fashion. When those emotive states exceed the normal measure in intensity and persistence, they exercise an absolute dominion over the consciousness, until, through their having once assumed government over the senses and the intellect, there is an alteration of the perceptive and the apperceptive processes that insure normal relations between the individual and his environment.

The evidence of the facts goes to prove that these emotions are not evolved. Their prevalence proves a defect in the evolution of the personality, in which there is lacking that degree of apperceptive power that is the surest guarantee of a due adaptation of the individual to his environment.

Paranoic deliria are, therefore, not autochthonous ideas, but of emotional origin. The emotional character of the malady is frequently lost, just in proportion as the delirious ideas become concrete, affirm themselves, and assimilate the most adaptable part of the content of the personality. When we find an occasion to follow out the evolution of a personality, first in the state of sanity, and then from the moment that it begins to bend and take a paranoic

direction, we acquire conviction that the idea of the delirium does not rise in the consciousness *per se*, is not a fungus, certainly not an embryonic element that has perchance found its way into the structure of the personality. It is not preformed, like those embryonic cells that have not undergone the normal metamorphosis into specific tissue, but have remained entangled in the tissues, while their destiny is to become a canker or sarcoma when the moment arrives. This canker or sarcoma in its evolution invades the organ in which it is developed, and transforms it more or less rapidly, just as paranoid delirium does with the sane personality.

The fundamental emotions that prepare the ground for paranoid delirious ideas are attributes of man in his social aspect—suspicion, ambition, love. The fear of hurt to all that forms part of the ego, intrinsic or extrinsic, all that reflects one's own personality or what one possesses, is in inverse proportion to the psychic vigour, and especially to the power of apperception of the social relations. Ambitious aspirations towards the exaltation of one's own personality form the mystic dream of adolescence, when the troubled spirit, in its abstraction from a reality that it does not yet understand, abandons itself unconsciously to the waves of fancy, and, plunging into a dream-world of joys, of power and of riches, is fascinated by what it finds there. Then the subject, who lacks one or other of the intrinsic or extrinsic elements, physical or psychic, individual or social, required for the realization of his dreams, finally mistakes the dream for reality, and becomes a confirmed believer in the world of chimeras.

These three emotions—suspicion, ambition, and love—give the three classic forms of paranoia: the persecutory, the ambitious or proud, and the erotic.

The defect of evolution that characterizes those individuals who are attacked consists precisely in the prevailing tone of a primitive emotion, not duly evolved, in association with a defect, original or acquired, of the apperception of the relations of the individual to reality. The suspicious person who surrounds himself with precautions in order not to fall into the net that his adversaries spread for him, thus clearing the way for his advance, and the ambitious subject, who sees his objective, and to attain it disposes to the best advantage his own powers and all the means that he can command, may be, and in most cases are, strong and victorious in the struggle for existence. The paranoid subject, on the other hand, is a weak person, who by his mode of thinking and feeling is driven into the world of chimeras, on which he expends all the power of his logic, and from which he is incapable of drawing back, and so reconciling himself with reality.

As will easily be seen from the foregoing, in none of its forms has paranoia any atavistic character, according to the doctrine maintained so brilliantly by Riva and by Tanzi, following what

Lombroso has said with regard to the analogy between the nature of crime and the criminal. The intellectual content of paranoia is nourished by the life of the environment, advances with the subject through the various stages of his evolution, and changes only in so far as the object of fear and of human ambition changes with the progress of thought. In ancient times gods and evil spirits inspired this fear. The relentless struggle for existence, altogether a feature of modern times, has impressed a new character on the delirium of the present day. In a lecture forming part of a course on psychiatry delivered at the University of Palermo I said :

‘The spirit of modern times, as displayed even in the genial work of Manzoni, in which religion becomes again a consciousness of one’s own duty and of resignation, and human persecution is substituted for the persecution of evil spirits, has insinuated itself into the public consciousness ; and, with the struggle for existence, in which all are called to take part, fully revealed, that spirit gives the key to the deliria of modern society. This struggle, in which only human resistance, human difficulties, and human enemies are met with, and in which the exalted aspirations of the weak are broken against the bulwarks of the strong and of the astute, leaves in its track an endless number of fallen victims, who, too weak or crushed in the lost battle of life, pass the bounds of the domains of psychiatry, and live amid “the unconscious” on what once formed the subject of their dreams or their fears—viz., visions of wealth and thoughts of bitter enemies—that is to say, on the delirium of grandeur and the delirium of persecution’ (*‘Gli orizzonti della Psichiatria,’ La Psichiatria, etc., 1899*).

In 1893 Magnan expressed this same idea (*Leçons cliniques sur les maladies mentales*) :

‘We know,’ he writes, ‘the general characteristics and mode of evolution of the chronic delirium, but the aspects under which the patient presents himself vary with his religion, his beliefs, his education, the social environment in which he lives, and his preoccupations. From these diverse elements he draws what he requires to form his delirium, and give it a special character. On one side we see the delirium of the Middle Ages, with its superstitious beliefs, and on the other, the modern delirium that utilizes the progress of science and of industry in connection with political struggles and with the new social organization. Towards the close of the Middle Ages and at the period of the Renaissance men spoke of witchcraft, of evil spirits, of obsession and possession by devils, and the delirium was nothing else than the reflection of those beliefs and of those prejudices which ignorance rendered still more profound. At the end of the eighteenth century mesmerism and the magnetic fluid, just like spiritualism later on, with its invocations of spirits and turning of tables, served the persecuted subjects with an explanation of their morbid sensations. To-day political struggles,

the great forces of Nature, and the numerous applications of physical and chemical agents, magnetism, suggestion, microbes, and the great political societies, have replaced the marvellous, attract universal attention, and become the point of origin of delirious ideas.'

Of course, it is true that even to-day we meet with paranoic deliria of religious content, such as melancholic deliria of obsession by demons, or of sudden bewitchment, etc. ; but there is no necessity to fall back on a theory of atavism to explain the origin of these. These beliefs still exist among our people. Education and social progress have succeeded in freeing the minds of a certain class from these ideas, perhaps the most select class in the civil world, but people in the lowest strata still live under the influence of these beliefs ; and even men who have reached a high level of culture and of mental evolution have imbibed the same ideas and the same beliefs during their childhood, in their domestic circles or amongst the people.

These are survivals from the Middle Ages. Human evolution is slow, and primitive characteristics have not yet disappeared from mankind. Why, then, have recourse to a theory of atavism ? Everything that the paranoiac (and the same may be said of all delirious subjects) manifests in his delirium is found in his actual environment, or in another environment in which he lived at one period of his life, and which now forms an internal or mental environment, so that all that remains is the exaggeration of the fundamental emotiveness and the insufficiency of the power of apperception of the relations of the individual to his environment.

These two fundamental facts may manifest themselves at an early age, before the personality has been completely evolved, and in such a case we may speak of developmental primary paranoia ; or they may appear in mature age, when the struggle for existence is keener, and when the obstacles in the way of the realization of one's desires in life are greater, while the ambition is also greater, and in this case we speak of late primary paranoia. The latter, however, may be distinctly founded on a paranoic character exhibiting suspicion, ambition, asceticism, etc., and then we say that we have a form that is clearly degenerative—that is to say, due to defective development ; or we may have an acquired form in individuals who had no reason to manifest any of those features that mark the paranoic character (which might be considered as rudimentary developmental paranoia), and this we shall call acquired paranoia (ordinarily neurasthenic). This last, as it is of toxic origin (auto-toxic), and develops in individuals of good mental constitution, is placed in the second group.

The existence of a systematized delirium, whatever its content may be, does not warrant us in recognising paranoia in all cases.

We meet with systematized delirium as an epiphenomenon or as an episode in various maladies. True paranoia, with which we are now dealing, is a constitutional malady that has its foundation in an anomalous psychopathic structure, generally developmental, and it is evolved in many cases on a fixed method, with a certain succession of facts, which, in their historic totality, give to the paranoia an aspect that is perfectly recognisable.

In paranoia all the representations that have not been altered morbidly have regular relations among themselves (Mendel), the logical process and the syllogistic power of the intelligence being always preserved; but the power of verifying and controlling the reason is lost, and thenceforth the senses obey false premises. This condition of affairs is represented by Robinovitch in a metaphor when he writes that the intellectual apparatus of the paranoic subject is to a certain degree comparable to a good flour-mill, which, instead of grinding grain, grinds stones (*Des variétés cliniques de la folie en France et en Allemagne*, 1896). In this case the stones represent the predominance of a fundamental emotion not corrected by a sound judgment—an emotion that determines a current of thought unrelated to reality.

It is not to be wondered at if in all countries, at a certain stage of the evolution of the people, we find the same paranoic deliria—the *primordial deliria* of Griesinger. The theory of myths is not applicable to these deliria, nor can they be considered as effects of a process localized in a given region of the brain, as Krafft-Ebing supposes. This last supposition has no solid foundation.

The reason of a certain uniformity that exists in paranoia in all countries will be found in the emotive origin of paranoic deliria, and in the emotions themselves that provoke those deliria. The desire for greatness and pleasure, and the fear of being deprived of these, are fundamental and universal emotions. The lack of moderation in the desire and the fear, and the return to a great extent of the ego of childhood (Meynert, Del Greco), as the result of disaggregation of the personality, afford the explanation of the phenomenon.

All that is atavistic in the paranoic subject who superimposes infantile personality on the adult, thus bringing the old ego into active life, in coexistence with the new ego (Schüle, Séglas), is the disposition to present, as a result of impressions, the fact of a distinct and hostile intelligence (Del Greco, '*Sulla evoluzione del delirio paranoico*,' *Manicomio Moderno*, 1897-98).

This holds for the delirium of persecution.

From the group of paranoias we rigidly exclude all those systematized deliria consequent upon other psychoses, the so-called *Wahnsinn* of the Germans. These systematized deliria, accompanied by recomposition into a new personality of logical aspect, follow on melancholia and hallucinatory insanity (Group II. of our

classification). In these states we have systematized deliria that are secondary, and that have taken root in a soil exhausted by the primary malady—that is to say, in mental enfeeblement.

Further, it is necessary to exclude from the group of paranoias all those states of confusion and of hallucination, acute or subacute, such as the amentia of Meynert, acute sensory delirium, and the delirium of collapse, which Binswanger thought right to include in the group, although certainly at the expense of clearness. All these syndromes have nothing to do with chronic paranoia, the subject that occupies our attention here. The acute or subacute sensory forms belong to a group with which we shall deal in another chapter. In this regard I am in accord with Sciamanna and with Tanzi and Riva, who consider systematized delirium as a symptomatic group, whilst true paranoia is believed by these two authors to be a constitutional malady distinguishable by its degenerative origin, and by the course it takes (Tanzi and Riva, *La Paranoia*, etc., Reggio-Emilia, 1886).

Secondary paranoia always has a basis of mental decadence (Tonnini), and therefore cannot be confused with primary paranoia. In hallucinatory confusion the presence of an apparently systematized delirium depends upon the individual temperament, and upon the predominance of certain hallucinations; but even these forms cannot be confused with primary paranoia.

On the other hand, we include among the forms of paranoia those that develop at a late period in individuals who have been cured of a simple psychosis, such as melancholia or a sensory delirium. Wernicke also recognises, in a certain number of paranoias, the after-effects of an attack of acute insanity, and particularly of acute hallucinatory psychosis (*Die Paranoische Zustände*, Leipzig, 1896). This is a view we held thirteen years ago (Lojacono), and it is certainly accurate. In these cases, which are not at all infrequent, the primary psychosis aggravates the hereditary weakness, and after recovery the brain is left more vulnerable than before, whilst at the same time there remain in 'the unconscious' residua that prepare the way for the paranoic tone of mind.

It is upon this soil that paranoia is developed later on, and such paranoia we may consider to be primary, although it has a genetic relation with the preceding psychosis.

The chronic delirium of Magnan, with constant or almost constant evolution, is one of the forms of paranoia that we shall discuss.

On the other hand, seeing that emotion acts, in accordance with the condition of each individual person, sometimes directly upon the thought and the process of synthesis, at other times upon the sensory field, it is clear that we may have simple intellectual paranoia and also hallucinatory paranoia. We term the paranoia hallucinatory when the hallucinations provoked by emotive tension of the

mind are of uniform content, and determine a paranoic current of thought—that is to say, the hallucinations do not affect the logical power, and do not induce confusion.

In the development of paranoia many authors recognise four stages :

1. The prodromal stage—the period of inquietude, or of subjective analysis according to some other authors.
2. The stage of ideas of persecution.
3. The stage of ideas of grandeur—the period of transformation of the personality, according to Regis and others.
4. The stage of mental enfeeblement or pseudo-dementia.

According to these stages in the evolution of paranoic deliria, it would appear that the deliria of grandeur are always complementary to the deliria of persecution. Daily observation, however, proves that the delirium of grandeur is complementary to that of persecution in virtue of the same law by which the delirium of persecution is sometimes complementary to the delirium of grandeur. Paranoia emanating from two fundamental emotions develops, by the action of factors special to each individual, either as paranoia of persecution or as paranoia of grandeur, in the first instance, and the complementary delirium may, or may not, subsequently associate itself with the primary delirium.

There are cases of paranoic deliria of persecution and of grandeur that are never complicated by complementary deliria, no matter how long they may last.

Some of these deliria do not follow a regular process of evolution, nor do they present the phases above mentioned. They run an irregular course, and vary in content, or they show phases of improvement.

I consider it nearer to the truth to divide the evolution of paranoia, or the 'systematized progressive insanity' of the French, into three periods :

1. The prodromal period.
2. The period of efflorescence of the delirium, primary and complementary, when there is a complementary delirium.
3. Mental decadence.

From what has hitherto been said, we are enabled to distinguish :

1. The paranoic character (rudimentary paranoia).
2. Developmental paranoia, manifesting itself from the period of adolescence, or even earlier (Sander).
3. Late paranoia, developing upon a paranoic character that is but slightly accentuated or even latent.
4. Acquired late paranoia, developing upon a normal constitution. This form, however, may, at least in a good number of cases, be placed in the second group of our classification, along with acute paranoia.

Late paranoia can be distinguished as : (a) simple—that is, with-

out complementary delirium ; (b) complicated—that is, with complementary delirium.

Both late and developmental paranoia are further distinguished as intellectual and hallucinatory. The intellectual form commences and continues, for some time at least, without hallucinations, whilst the hallucinatory form commences with hallucinations.

The delirium of grandeur is primary much more frequently than is generally believed, and it completes its evolution without always giving place to delirium of persecution, or the latter may appear only at a late stage. In Part II. of this work I have related the case of Caporali, a poor tailor who dreamt of raising the economic condition of his district, and threw stones at Crispi, who was then President of the Council of Ministers. Here I quote a portion of a very long letter addressed to me by a patient in a fairly good position and of some education, who had proved despotic and undisciplined from his childhood, both in his own family and in boarding-schools, from which he was expelled. In 1881 Professor Virgilio found that he was affected by megalomaniacal paranoia, and a few years later he became a subject of study in the Provincial Asylum of Naples.

OBSERVATION. XIV.—This patient belonged to a neuropathic family, but did not present any anthropological degenerative stigmata, nor any functional disturbances. He sent me a letter of 130 pages to let me know who he was. From the few quotations that I reproduce here we can reconstruct his psychic personality, and trace the developmental disturbance in the form of paranoia superba.

' You must know in the first place, Professor Bianchi, that when I was born in 1851 my parents were expecting a girl, and it was their disappointment in the sex that they had expected, and that did not arrive, that first determined the character of my tempestuous existence.

' I consider it useless to add or to prove here that I was not responsible for this first family discord provoked by my birth on the evening of December 23, 1851—a discord that was to prepare for me a life of such agitation ; for, as it was not in my power to transform myself into a girl, I had to yield to the embraces of my parents and be born a boy, and all that I need say here is that from my mother I inherited extreme sensitiveness. From my earliest years this sensitiveness was the torture of that part of my life that I am now relating to you. In fact, had I been born less sensitive, I should not have been able from my very infancy to be conscious of the want of concord that estranged me from the environment in which I was born ; and had I not felt that want of concord, I should have experienced no mistrust ; and in the absence of mistrust I should not have detached myself still further from my parents in our common relations ; and had I not detached myself still more, the lapse of years and our common good dispositions would probably have removed the disappointment on the question of sex, to the satisfaction of both parties : for if my parents had tolerated me, and had I identified myself with their desires, sinking everything in one single thought, the discord arising from my birth might have been removed by the concord of my life. That concord was never reached, because, *as I came to understand the matter too soon, and could very little tolerate the state of affairs, I entrenched myself in the idea of maintaining my own individuality at whatever cost, for I*

would not have my individuality sacrificed to a misunderstanding, for which I felt I was irresponsible. If my parents chose the wrong time for procreation, it did not follow that I ought to sacrifice my days because of the mistake of my being procreated in absolute ignorance of "*cause and effect.*" *Therein is involved a social science that ought to form one of the bases of the reform that I desire, and for its practical development we must have reformatory asylums, arranged to compensate the very strange metamorphoses of social conditions, which destroy all order in the presence of humanity.* That is why, as my origin was a very painful one, I have always been able to keep to a fixed determination to do one thing rather than another; *for ever since my most tender years it has been my exclusive idea not to allow myself to be overmastered by the dispositions of those who, having got me when they did not wish me, might agree together to dispose of me without my knowledge.*

'As you will clearly see, it was my individuality that was asserting itself, and it was *an individuality that was neither erroneous nor blame-worthy, because, if we are to contribute to the end of the true well-being of humanity, it is necessary for the growth and development of our offspring that they should not confound their proper and essential characteristics with the temporary character of their procreators, identifying themselves totally with the succession of the same,* so that after the space of nineteen centuries we find ourselves developed, simply through certain improvements that are the exclusive product of the scientific, literary, and artistic spirit. In point of principle, however, the best Christians of the present day correspond exactly to the Hebrews of the ancient Law, except as regards those formalities that the action of Christ drove out of the Temple of Jerusalem and that have been reconstituted in a different form in the *Church of Rome, which, taking into itself all the evil of the old system, and patching up the worst in the wounds of the dead Redeemer, has drawn from the fusion of the Old with the New Testament the paradox of a form that can be adapted to meet all requirements.*

'In speaking in this way, I have no intention to refer to the Christianity professed by my parents, who are debased in my sight by the simple fact that principles have been *maliciously* falsified in their minds—a result that plainly accrues from the marriage of the old with the new, an evil result which, even after nineteen centuries of Christianity, has not yet been circumscribed and brought into harmony with the just requirements of the new Society, which, rather than yield to an impure Christianity, is desperately opposing the ministers of imposture, and, in its endeavours to get rid of the impurity of those in power, sometimes makes mistakes in distinction, often violating the purity of its Founder. *That is the reason why I was incarnated in the new blood, and, through the force of my precocious intelligence,* I avoided confounding my infantile theories with the hallucinations of those about me, so that from my infancy I was condemned to struggle in order to maintain my individuality, which was threatened by the vicissitudes that had preceded my birth. Raised upon the pedestal of thirty years' experience, in 1881 I was able to swallow the bait held out to me by Professor V. You will understand the intrigue. Anticipate me, therefore, in divining its consequences, arguing these from the hostile reception I met with within the domestic walls in 1851, when I made my first appearance in the home, being really responsible for the misunderstanding that then arose, and that still exists, between my parents and me; whilst in 1864 this misunderstanding, when unmasked, gave my father the occasion to revenge himself on me for the mistake in a question of responsibility that weighed and still weighs heavily upon him. . . .

'When this has been said, what more would you have me say?

'I might continue in order to satisfy your desire completely, but at this moment such a course would be ridiculous were it spontaneous,

whilst it would be an act of violence were you to demand it from me. And, really, who am I that speak ?

'According to the Civil Register kept in the Archives of C., I am G. S., born in December, 1851, of parents N. and A. In the view of the Department of Public Order, represented in Caserta by the Prefect G., I am a lunatic, brought before the Tribunal of the Social Conscience. I am one who has lost his way, but am worthy of consideration rather than of maltreatment ; in the eyes of humanity ? . . .

'If I really have a mandate to fulfil in the sight of humanity, I do not intend to sacrifice my name and my paternity to my mandate ; and if I have not such a mandate, why should anyone try to divert me from that, and to give me the lie before I have proclaimed myself ?'

Later on, by a gradual but continual evolution of the idea of his capacity, he formulates his delirium more fully, but without a trace of sensory disorder. Continuing to develop a plan of internal and foreign political action, he comes to the following conclusion :

'Further than that, let both the idea of an Italian Republic and the other idea of the return of the Bourbons be abandoned, if you will, so as to calm anxieties and popular agitation, the groanings of a people that desires and finds not what it desires, *the will of a mass without a head, that writhes about, contorts itself, stretches itself out, draws back again, expends its breath, and does nothing* ; we may then proceed to the explicit affirmation of Italian nationality. We must absolutely fight and conquer, and in the present state of European affairs we should have much sympathy if we were to attack France, while certainly we should come out victors if foreign politics were directed by a man who knew how to prepare the ground properly.

'Where is that man ? I see him not ; but, had he not been disturbed in 1881 by that phrenologist V., to-day he might be at his post.'

In this patient there does not exist, and there has never existed, any trace of delirium of persecution, if we except the resentment against the alienist who declared him insane in the year 1881, and against his father, who had on two occasions requested and obtained the confinement of his son, first in the Aversa Asylum and afterwards in the asylum of Naples.

Here we find a lucidity of ideas that is not common, arising from the consciousness of an overdeveloped personality, proud, but without any sensory disturbance (simple intellectual paranoia with political character, the 'political delirium' of some writers).

Another inmate, among many whom I have observed, addicted to onanism for many years, conceived the design of releasing humanity from the evils that afflict it, by demonstrating the origin of those troubles. According to him, all evil results from the metamorphosis of the sperm of onanists into evil spirits. The voluminous work that he wrote, full of the strangest arguments, was the result of long lucubrations, for the writer had isolated himself from his family, and shut himself up in his own room, where he lived a misanthrope, in order to elaborate this precious treatise. When it was completed, he even resorted to violence to get possession of his mother's money in order to publish it, altogether regardless of a sister who was dying of tuberculosis, and so he had to be removed to an asylum.

The following case proves how the circumstances of life can determine the current of paranoic thought in the minds of those who are so predisposed, and sow a seed that germinates slowly, doing its work in *the unconscious*. When 'the unconscious' has been filled with new products, then a sensory error is sufficient to give the consciousness a clear notion of what was in the background, or of what it had only a hazy idea. This is a typical case of primary paranoia of grandeur, developed, one might say, under our eyes even till it reached the degree of pseudo-dementia, and giving rise at a certain stage to a rudimentary delirium of persecution. The most important feature of this case is the fact that the original rudimentary paranoia of grandeur goes back to the early youth of the subject. It was strengthened by the words of her dying mother, and the delirium of jealousy, which is a form of the delirium of persecution, was only an acute episode that interrupted the course of the evolution of a personality clearly and developmentally megalomaniacal. Here is the case :

OBSERVATION XV.—Long. Raff., fu Luigi, forty-three years of age, of Castellamare di Stabia, was sent to the asylum of Naples on February 27, 1901, because, according to the letter that accompanied her, she was affected with delirium of jealousy. More than two years before she had commenced to doubt the fidelity of the man with whom she lived in concubinage, until that doubt was transformed into a delirium of furious jealousy, with all the train of phenomena of hallucination and illusion that generally accompany delirium of that sort.

It is known that her father was a gambler and a hard drinker, and that he died suddenly, after having dissipated a moderate fortune. Her mother died at forty-two, probably from a cardiac affection. She has only one sister living ; four other brothers and sisters died in early childhood. When a young girl she suffered from enteric fever, but after that she had no other illness worthy of note.

She was brought up with great care by her mother, who was extremely fond of her. On her deathbed her mother gave only one charge to her husband, and that was to take care of the upbringing of this daughter, who might have a good future, because she was beautiful and had a lady-like manner and bearing, *as though she had been born of a princely house*. Our subject has never forgotten those words of her mother, and afterwards, in the hydropathic establishment managed by her father, when she saw that attention was paid to her by many of the gentlemen who came there for treatment, including Prince Tizio and the Marquis Cajo, she began to ask herself whether the words of her mother were not really intended to be a revelation. It seemed to her almost impossible that the daughter of L. Long. should receive attention from so many and so elevated personages. The doubt as to her real origin commenced to dominate her mind from that time on ; but still, because, as she herself expressed it, she had a high opinion of herself, and was proudly conscious of her dignity, she remained content with the modest position of her family. She fell in love with a man whom she now declares to be unworthy of her affection and too far beneath her in rank, and she united herself to him, with no other bond than that of love. Years thus passed in comparative tranquillity.

As she advanced in age, either she herself came to understand or else her relatives pointed out to her the irregularity of her position,

especially with respect to the future of her children, and she demanded her lover should marry her. When the latter pointed out difficulties in the way, she supposed that he had carnal relations with other women, and even thought that he was married to someone else. Then the delirium of jealousy broke out, accompanied by corresponding hallucinations. She declared that she had seen her lover in the arms of women of all sorts. He used, she said, to bring them to her house, and in her presence he would abandon himself to shameless acts with them. Nothing else was talked of in the neighbourhood. Her lover's doings formed the subject of every conversation. Her rivals in her lover's affections turned their attention wholly upon her; they insulted her, and did everything possible to vex her. They even invented a machine to drive her out of her lover's thoughts.

In such a state of mind, fired by jealousy, troubled and upset by hallucinations, with all power of critical judgment lost, she could no longer put any restraint upon the ideas of grandeur that had been germinating in her mind from her early youth. Hitherto these had been only vague and suppressed, but now they took the form of a delirium of unbounded grandeur, well organized and developing in the three phases of beauty, riches, and high birth, but more especially the last. As we have seen, she had suspected from her childhood that she was not the daughter of L. Long. It was only at a very much later date and through a very strange occurrence that she decided who was really her father. One day she had gone to visit an exhibition of waxworks, and she was much struck when she observed that the eyes of the figure which she was told represented Napoleon III. were fixed upon her; and it appeared to her also that the chest of this figure heaved with emotion. There was no doubt that the spirit of Napoleon, present at that moment in the wax figure, was much moved by beholding his daughter before him. From that day our subject has had the conviction that she is the daughter of Napoleon III., the offspring of the illegitimate intercourse of the French Emperor with a Countess whose name she does not know. She no longer calls herself R. Long.; her true name is 'Bisbina Napoleone.' When she had become conscious of her true origin, the whole of her past was illuminated with a new light.

The Princes and Marquises who had paid attention to her at the hydro-pathic establishment were all of the Bonaparte family—all relations of hers who had come incognito to see her, to learn what she was like, and to protect her. The sums of money that these persons paid to her father for the bath-treatment were really subsidies from her royal relatives to maintain her in a style worthy of her position; in fact, those payments were a part, although a very small part, of her royal inheritance. Now she wishes to leave the asylum, where she cannot live with all the ease and style due to her position; but she will not return to her lover, who, however, is the only person who really takes any interest in her, and comes to see her frequently. If she left the asylum, she would never wish to hear of him again. She and her daughter would go and live with her royal parents, who would not tolerate the presence of her lover in their household.

In the asylum her behaviour is correct, but proud and haughty. She walks about alone, and does not talk either with the nurses or with the other inmates. It seems that she has the utmost contempt for all of them. With the doctors she is a little complaisant, but only because she understands that the possibility of her liberation depends upon them. She does not believe that she has enemies outside of the asylum, and, in fact, she has not any real delirium of persecution. Once she thought that she was being persecuted by her rivals in love, and now she supposes that the family Long. might have some interest in keeping her in the asylum, so

that they might get possession of her wealth. On this point, however, she does not insist. The only florid and systematized delirium is that of grandeur, and we have seen the genesis and the development of it.

The following case is an example of paranoia, perhaps developmental, which in its early evolution assumed the form of delirium of grandeur, strengthened by fugitive hallucinations, but was rapidly transformed into a pronounced delirium of persecution that underwent no further modification :

OBSERVATION XVI.—Di N. F., thirty-nine years old, bachelor, scrivener, was admitted to the asylum on August 16, 1890.

Family History.—His father suffered from gout. A maternal uncle, a priest, is so much feared in his district that the people called him 'The Fierce.'

The patient entered upon an ecclesiastical career, and took the minor Orders; but he gave up his intention of becoming a priest on hearing it said in public that his uncle, who was a priest, had been a scoundrel and a thief. Later on he entered the army as a volunteer.

He has been a confirmed masturbator, even in adult life.

He is of more than ordinary intelligence, credulous, and subject to suggestion. There is great predominance of sexual ideas in his mind, and since he was a youth he has had a great desire to marry.

When he was in the army he began to suffer from very vague and transitory sensory disturbances, which opened the way for ideas of delirium.

His mind became saturated with the desire to marry and with erotic ideas, while his health was undermined by onanism; and one evening he had hallucinations, probably oneiric, of which he gives the following account :

'I had been told off for duty in the fortress of St. Elmo, and one evening about 11 p.m. one of my corporals in the fourth company came to within a short distance of me, and called out the following words in my direction: "Marriage with a royal Princess"; and at the same time he held out before me a picture, in the centre of which was the Pope, surrounded by all the crowned heads of Europe. After the advice thus given me, and when I had clearly seen and learned the subject of the picture, I gave no answer to the words addressed to me, but resumed my own work.

'The significance of these words began to develop secretly in my mind, both day and night, and my mind was firmly made up to endeavour to arrange this marriage, and to hasten it on as rapidly as possible.

'In view of the great importance of the matrimonial alliance thus suggested to me—for I was not of the rank or in the position to marry the person indicated, namely, a daughter of a reigning Prince—I had arranged and determined in my own interest to adhere firmly to my resolution "never to contract matrimony unless the young lady concerned was handsome, cheerful, well brought up, a lady, of good character, with a considerable dowry, and well connected."

'I swear and confess that my mind was very much inclined to this proposal, and I endeavoured to use every possible means to effect the projected and much-desired marriage advised me by the corporal I have already mentioned, because, in the first place, it was advantageous, and, in the second place, it would insure me a sound financial position, while, lastly, it would enable me to satisfy my instinct normally.

'But the King became acquainted with this very proper idea of

mine, and with the plans that I had already set on foot to realize this ambition of my earliest youth, which the corporal's words had but served to rouse to stronger life. To prevent me attaining my object, then, he soon afterwards sent a confidential messenger specially to me. I was then attached to the Registration Office in the capacity of a scrivener, under the orders of the Colonel, and one day, while I was looking out of the window, a person whom I did not see, but whose words I heard clearly and distinctly, as he was standing at a point a very little way from the office, called out in a loud voice something to the following effect: "Write a letter to the King, and call him——" (here follow some insulting and trivial expressions).'

The first idea, suggested by a hallucination, was followed by the logical complementary conception of the resentment of the King and by the fear of punishment, so that in this state of mind the patient had hallucinations that might be termed hallucinations of contrast or of reaction against the King, whose indignation he had already begun to fear. Whilst in this state of mind, and when all his companions were sleeping, and everything was wrapped in the most profound stillness, he heard voices coming from a small passage beside the dormitory, saying to him, 'Cut your throat, cut your throat, cut your throat!' and they repeated the words so persistently that he seized his bayonet and stabbed himself several times in the throat, although he had no intention of suicide. Still the voices did not desist, but added, 'Thrust it in, thrust it in, thrust it in!' for none of the thrusts already made had proved fatal. There was profuse hæmorrhage, and in the morning the doctors found him to be in a very serious condition owing to the great quantity of blood he had lost. Whose were those voices? He saw no one, and certainly they were not the voices of his companions in the dormitory. This puzzling question, as well as the incident itself, caused him much mental worry. Thinking over the matter and collecting a number of clues, he came to the conclusion, many years afterwards, that the voices belonged to carabinieri and police, sent expressly by the King, who had agreed with his parents to destroy him. From that time forward he was on his guard against all possible enemies.

About a year elapsed, when one night, as he lay asleep in his room, he was disturbed by the sound of keys near to his door. The idea flashed through his mind that assassins had perhaps come to murder him. He did not lose his presence of mind, but caught up his rifle and fired into the air. Then, after he had dressed himself, he opened the door and went down the stair; but his *enemies had already fled*, and there was nobody to be found.

Through an extensive series of facts and circumstances, too long to relate here, the patient came to have a very firm notion that his parents were trying to secure his death, in order to obtain possession of his property.

To achieve their purpose, not only did they enter into an agreement with the Government, which had persecuted him ever since he had been in the army, but they put poison in his food, and employed ever so many other means, with the express idea of preventing his marriage. He was much given to onanism, and this, he said, had produced *paralysis*, of which he would certainly have died had he not noticed it in time. By marrying, he argued, he would have got rid of that pernicious habit, and the paralysis would certainly not have occurred.

This honest intention of his was opposed, not only by the Government but also by the doctors, and by all his relatives, with whom his enemies leagued themselves in their conspiracies against him; and, in fact, although he had been frequently visited by various physicians in the country, not one of them had opened his mind to him or made him

understand what was the origin of his troubles. It was only when he came into the asylum that he felt any improvement. One of the physicians suddenly found out the cause of his malady, and told him of it. He at once gave up the bad habit of masturbation, and he found that ever so many phenomena that had formerly caused him serious apprehension disappeared—for example, debility, headache, and ulceration of the mouth. This delirium remained for many years, systematized and unchanged.

In the asylum he behaved like a sane person, being orderly and correct in his conduct. Everything he said was quite to the point. He assisted the attendants, was industrious and composed. Still, he had a profound and rooted conviction that there was a conspiracy between his family and the Government to do him harm, to prevent him marrying, and to cause his death.

This case is very interesting, for it proves that the psychopathic predisposition reveals itself in extreme onanism, which in its turn produces debility, headache, kinæsthetic paræsthesia, and also defects of judgment. The altered kinæsthesia and the desire to marry prepared the way for the hallucinations. These first of all gave rise to the dream of a great marriage; then, by contrast, they caused actions of a very dangerous nature, such as making use of the weapons that he had, in obedience to hallucinatory injunctions. The hallucinations were not repeated, but they brought before his mind the question of the origin of the phenomenon, and after long reasoning he arrived at a paranoic conclusion, which was straightway accepted without further discussion.

The frequency of the primary character of the delirium of grandeur cannot be doubted. It may or may not be followed, sooner or later, by the delirium of persecution. Sometimes, as in Observation XV., the delirium of persecution is grafted on to the ambitious delirium before the latter is completely developed. In this case the delirium of persecution is rapid in efflorescence, so that it seems primary, although not really so, and after a time disappears altogether, with the development of the delirium of grandeur. The two fundamental characters of the personality, suspicion or fear, and ambition or vanity, frequently coexist. It depends on the predominance of one or the other, or perhaps on external circumstances, as we have already seen, whether delirium of grandeur or delirium of persecution be first developed.

Delirium of Persecution.—This may occur alone, or it may develop in a progressive fashion with complementary delirium of grandeur at an earlier or later period. Predisposed individuals show an anomaly of character from adolescence. They are timid, preoccupied with every trifle, and especially so with their health. They are inclined to lead a solitary life, are reserved, and often very emotional, addicted to onanism, or very studious. These last find no attraction in their companions, and do not join in their games. They go straight from home to school, and back again. They wish

to take the first place in school (ambition), and sometimes they succeed, but in other cases—the weaker among them—they fail. Protracted and uninterrupted brain work (mental effort), and sometimes onanism, give rise to a certain feeling of discomfort. They have vague pains in the head, gastric disorders, and changes of humour. These disturbances are often primary, and do not require mental effort to excite them; but they preoccupy the patients, and render them more subjective than they were originally. Thus begins the habit of self-observation, along with a tendency towards interpretation of the new phenomena. This condition of affairs may last a very long time, and sometimes the malady is not further developed.

In most cases the paræsthesia and the altered kinæsthetic sense, of which the sufferer is perfectly conscious, are accompanied by strange ideas. A patient will say: ‘So many ideas come into my mind that I never thought of before.’ He is not in a position to regulate these ideas, and among them there may be one that is predominant, and gives a certain direction to the nascent delirium. He can no longer follow at will the logical course of reasoning; the ideas belonging to ‘the unconscious’ are breaking out of restraint. The patient becomes more gloomy, isolates himself still more, and becomes more irritable.

His attention is especially directed to finding the explanation of this change, which reflects itself on his surroundings. Those with whom he comes in contact speak another language than before, the physiognomies of those around him appear to be changed, and it seems all regard him with no friendly air.

Meanwhile sleep is interrupted, and has no restoring power. It is broken by dreams that are repulsive and horrible. This frightens the patient still more, irritates him, and causes a certain confusion. It is usually at this point that sensory disorders, illusions, and hallucinations commence. On the street he finds that people look at him with an air of contempt, smile scornfully at him, make faces at him, and ‘signs’ referring to him. Sometimes even the persons of his own family are laying traps for him, although the mother is almost always excluded from this delusion.

In the newspapers, patients of this class find articles or phrases that they suspect to contain allusion to themselves. The conversation of people who pass along the streets at night they believe to be about themselves, and they think that those persons are conspiring against them. At this point the paranoic subject is already caught inextricably in the net of the delirium of persecution, or delirium of relations, according to Wernicke.

The sufferer becomes more attentive, and examines these new facts, anxious to learn at all costs what it is all about, who it is that is busying himself with him, and why such and such a conspiracy—for there certainly is one—is being directed against him.

The reply is given either by delirious explanatory representations or by hallucinations, which furnish new subject-matter relating to the disease. At first the hallucinations are elementary in character—some hiss or whistle, some indefinite sounds or vague words, the signification of which is not yet properly understood, but which the subject in most cases interprets as an insult, or he may believe that people ‘wish to confuse’ him.

Sometimes there are psycho-motor verbal hallucinations, while in other instances the hallucinations are the reflex of the patients’ own thoughts (*vide* Part II., chapter on Hallucinations).

With these hallucinations others are frequently associated, connected with the senses of smell and taste. The patient then declares that people are scattering poisonous gases all about; he smells them; he is breathing foetid air. They are putting poison in his food; the food has no longer the same taste as before. They have poisoned the water. [One of the patients who came under my observation had taken water to an analyst to have it analyzed, and had carried another sample to the Public Prosecutor.] The patient no longer feels safe. He becomes agitated; very often he is threatening.

From this point the malady pursues one of two directions. If the sufferer was a timid character, he feels himself discouraged and debased. He cannot bear the endless traps that are being laid for him, the torture that they cause him, or the insults to which he is continually being subjected. He already indulges the idea of suicide, and later on he may put it into practice. In most instances he seeks to escape this fatality by taking refuge behind some trusted member of the family, should there remain anyone towards whom his affection has not been altered by the trouble that has come upon him. These cases are the *resigned paranoiacs*.

In another group of cases reaction succeeds the more or less temporary discouragement. The persecuted subject accepts the struggle, decides to make a way for himself, and in a spirit of vengeance he sets out to seek his persecutors (presumed enemies). He goes over the story of his past life, with the result that events which were of very slight importance now acquire great value as clues to the personality of his supposed persecutors. The cases noted hereafter prove that very often the paranoic subject seeks in vain to establish the identity of his enemies; in fact, this is generally the rule.

They insult him, he says, they make him miserable, they electrify him, they act upon him by suggestion, they wish to put him to death; but he does not know why that is so, or who are his persecutors. The futility of the search and the necessity, not only of identifying his enemies, but of learning the details of the plot, of which thenceforth he has no longer any doubt, ultimately force him to the conviction that secret societies—the Jesuits, the Freemasons, the Maffia—the Government, or a chief of a Government Depart-

ment, desire to get rid of him. The hallucinations continually add fresh fuel to the fire. His enemies come to insult him even in his own room; they are concealed behind the door, behind the walls, above the ceiling, and under the floor. 'I hear the voices everywhere,' he says, 'and they have found a way of getting at me, even in my own room when I take refuge there.' Paræsthesia of the face is interpreted as wind blown by his enemies or as electricity.

The sufferer has no rest. If he is armed he becomes threatening, and discharges his weapon in the direction of the voices. He runs off to the police or the Public Prosecutor. He may change his residence, and go to a foreign country to escape the torment, but the persecution follows him everywhere. A patient of mine travelled all over Italy, continually persecuted by threatening voices and by the figure of a woman who wished to take revenge on him. Then he left for America, but at New York, at Chicago and Philadelphia, the same voices and the same woman's figure haunted him. He returned to Italy, and eventually becoming the victim of extreme agitation, was brought to the asylum (migratory pananoïacs, Foville).

If, on the other hand, the paranoïac fixes the identity of his persecutors, he tries all legal means to free himself from the latter. Failing in that, he takes the law into his own hands, and accomplishes his vendetta either impulsively, on the slightest occasion, or with premeditation, in which case he is cruel and remorseless. He will cut a throat with a knife, use firearms at a very short range, set fire to buildings, etc.

From time to time, when the hallucinations are more vivid, he becomes impulsive, violent, sudden in his movements, and attacks the first person he meets. He displays extraordinary strength and ferocity, in this respect resembling the epileptic. The persecuted becomes persecutor (Lasègue), and is certainly one of the most dangerous of patients.

In the asylum, as in the family, paranoïacs of this class are always mistrustful, threatening, and hard. They have no affection for anyone; they hate. They do not reveal their anxieties frankly and openly. They suspect everyone, no matter what degree of kindness is used towards them, and they are among the most dangerous of patients.

As a rule, such an intense degree of delirium, with extremely vivid hallucinations and impulsive reaction, does not last any length of time. This condition is most frequent towards the end of the prodromal period, and in the period of efflorescence of the delirium, especially at the beginning. Later on, once the delirium has been clearly formulated, and there is a fixed consciousness of the change that has taken place in the surroundings, there comes a slow adaptation to the new conditions of existence, followed by

comparative calm, interrupted now and then by phases of agitation and impulsiveness.

The delirium is thenceforward systematized, crystallized, and reinforced from time to time by hallucinations. It may be limited in extent, and the patient may take up some occupation, making a certain use of his culture and his habitudes, or the whole mental patrimony may be assimilated by the delirium, whilst power of critical judgment is almost completely suppressed. The logical power also decays slowly, and the syntactical form of speech and writing is altered. The conversation is strange, and the round-about ways in which conclusions are reached are very striking (paralogia).

Neither the ordinary form of language nor the common vocabulary is sufficient for the new personality in its new relations with the external world. New words are required for the new mental syntheses, answering to the persecution, the persecutors, and the changed personality, and so the subjects create new vocables that serve the purpose better. These are the neologisms so thoroughly studied by Tanzi. With the paralogia there gradually commences a process of mental decay that is sometimes rapid, but sometimes is established only after ten to fifteen years, or even longer.

Some of these paranoiacs, persecutors rather than timid subjects, manifest ideas of grandeur at an earlier or later period in the disease.

These ideas pre-exist in the vain and haughty temperament of the persecuted subject. They gain the upper hand from time to time during the period of efflorescence of the delirium of persecution, or even in the prodromal period. They are organized and synthetized most frequently in the period of paralogia, if I must use the expression, just when mental decay is commencing. When these ideas are thus organized, and the personality has been transformed by the new products, the two deliria coexist, with prevalence of the delirium of grandeur, which gives the intonation to all movements and to all the attitudes of the paranoic subject.

This transformation hardly ever occurs in those persecuted subjects who have no hallucinations. These latter are rare.

The paranoic delirium of jealousy is merely one mode of manifestation of the suspicious paranoic temperament. In this form of paranoia the subject is eminently suspicious, generally poor in mental resource, proud, and believes himself to be offended in some point, very uncertain, but still embodying what the common man holds most dear—love, pleasure, or honour. This possession is an intrinsic part of the proper personality, but is entrusted to another being, with which the personality has common interests of an extremely intimate character, and this other has a will of its own. This is not at all a special form of paranoia.

The jealous paranoic subject, like the persecuted subject, is timid and jealous, or proud and jealous, with no idea of the limits

of the right of possession. This form of paranoia, in its various degrees of manifestation, follows out the same phases as the delirium of persecution. It gives rise to mutilations in the case of women, or to murder, more frequently resorted to by men. I have made reference to one case, and Maschka, Pellegrini, and others have published cases.

The following observations are examples of simple paranoia with hallucinations :

OBSERVATION XVII.—C. Ros., of Messina, forty-five years of age, bachelor, coming from America, was received into the asylum on November 28, 1895. His parents had died of cholera many years before. We have never succeeded in finding out whether there had been any cases of neuropathy or psychopathy in the family.

From his infancy up till about fifteen he was a sacristan. When his parents died, as he could not live on the money he got for his church services, and, further, as he was utterly tired of that life, he chose to serve as a waiter in a café of low order. After a year or two he abandoned that profession also, and went to work with a cloth manufacturer, with whom he remained for six years, when he was attacked by granular conjunctivitis, and had to resign his situation. As he was of rather a touchy disposition, he immediately gave instructions that the money still owing him should be paid back to the employer, and he was the more anxious about this because a day or two before, for some trifling reason, he had broken off all relations with his fiancée, a relative of his employer. He was at once reduced to want at the very time when he had to consult a medical man.

After his recovery he took to the sea, and sailed for many years as a foreign-going seaman on vessels of Italian and other nationalities. In 1891, however, he was forced to abandon this new vocation owing to the development of a right inguinal hernia following upon some unusual strain. He therefore determined to remain in America, where he made a living by vending fruit.

He has had no previous illnesses of any consequence.

Even as a boy he was not fond of the thoughtless life of the young. He has always been sparing in his indulgence in venereal pleasures, particularly in the last few years ; but, on the other hand, it seems that he has not been altogether free from the vice of masturbation. He has suffered from gonorrhœa more than once, and he contracted an ulcer which we cannot be sure was not syphilitic. He has been an inveterate smoker and chewer of tobacco. He was not habitually a heavy drinker, but whenever temptation was placed in his way, he could not refrain from indulging.

In America he lived as a true misanthrope (paranoic character). Not only did he not care to make acquaintance with the numerous Italians living there, but he even avoided those who came from his native island. He lived with an English family, but he had as little to do with them as possible. His life was hard enough, for all his energies were devoted to increasing his savings. He did his own cooking, and he never allowed himself any sort of recreation.

His vocation caused him to pass a great deal of his time on the streets, and numbers of children went to him to buy fruit. He gradually lost his innate roughness, and used to amuse himself by joking with them. After repeated inquiries, we have managed to find out with certainty that one day there came into his mind a suspicion that in New York people believed that he had carnal relations with those children (psychic

contrast). That belief began to take such a hold of his mind that it became painful for him to live tormented by such a cruel suspicion, and he went to a druggist whose shop was opposite his stance to ask him whether he knew anything of those rumours that were current. Notwithstanding the assurances and the encouragement given him by the druggist, he could not rest. A dream gave further impulse to the growth of the germinating delirium, and the more so because it had been his experience that after a dream of a certain sort a misfortune was sure to occur to him. Thereafter followed sensory disturbances, illusions, and hallucinations. He commenced to see waggons, generally empty, sometimes laden with useless rubbish or sand, that always tried to run him down at a gallop the moment he noticed them. At other times, passers-by no sooner came up to him than they threw a stone at him, or gave him a blow with a stick, or called out loudly to him: 'You ought to be arrested; you should be put to death!' He had no peace, and, as he believed that the whole city was up against him, he thought it best to return to Italy.

During the voyage he had not a moment's quiet, and the sensory disturbances became more and more intense. He thought that a party favourable to him had been formed, and that it defended and applauded him, while an opposing party endeavoured to destroy him at all costs. He broke out into violent conduct, shouted, and made such a noise that he had to be locked up. As soon as he arrived in Naples, he was taken to the asylum.

There the patient is generally dull, self-engrossed, and gloomy. He takes no interest in anything, and looks at no one. He walks up and down the hall with his head forward and his arms folded, with the aspect of one who is brooding over some very serious matter that has to be decided. A smile often flits across his face, but it is a strange and forced smile that clearly reveals the internal struggle in his mind. To him may well be applied that phrase of one of the Italian poets, '*Questo che par sorriso. ed è dolore.*' If he is addressed and spoken to frankly, in a friendly and encouraging tone, he stands and looks at the speaker for a certain time in silence and with an air of suspicion; then he gives his answer, which is always short and generally faulty and incomplete. Not always, however, is he to be found in this state of exterior and apparent calm. There are rare periods in which he is subject to great agitation. This happens particularly when he is a prey to sensory disturbances, for terrifying hallucinations dismay and prostrate him. He hears threatening voices telling him that in a short time he will be put to death, he will be cut to pieces, stoned, and so forth. He hears the steps of persons coming to him to carry out their murderous intentions. At such moments it is very difficult to keep the patient under control, for he breaks out into mania, runs towards the doors and tries to force them, yells and shouts at the pitch of his voice, and when he sees that all is useless he commences to threaten and imprecate. If he hears a noise, he thinks that his executioners are approaching. If he sees a chair, he declares that it is in that chair he will sit to be fusilladed. The friendly and reassuring face of the doctor wears for him a look of pity; he is always looking around him and finding hostility on every side.

The sensory disturbances are not always so intense; as a rule, indeed, they are fleeting—for the most part illusions—and do not provoke such violent reactions. At other times the patient assumes a threatening attitude towards those in charge of him: they wish to put him to death, but he does not intend to let them have their will, and if anyone has any evil intentions against him, let him think twice before trying to put them into effect. He will face his enemies, who will have to make their account with him, and woe to them!

His ideation revolves especially about those facts that form the

nucleus of his ideas of delirium. He cannot think of anything without giving it a signification hostile to himself. He feels that he has been debased, and that he is the object of the ill-will of others, but he cannot say what is the reason of his torments. 'I do not know,' is his constant reply. 'There are intrigues against me—I have continual proofs of that—but I cannot tell who is at the bottom of them. Everybody is in a conspiracy against me, and continual *demonstration* is made before me.'

There is a certain slowness in the development of his ideas. As he is preoccupied with other thoughts, his replies are slow and often not to the point.

He is very suspicious, and often he is unwilling to reveal any of his thoughts, going the length of denying what he has previously stated.

The perceptive process (except the sensory disturbances of which we have already spoken) and the memory are generally normal, if we bear in mind what is to be expected from an individual of his class, of not very high mental development.

Spontaneous attention is very lively during the periods of excitement, when all external stimuli reach the threshold of consciousness and are interpreted in a hostile sense, as already remarked, whilst it appears to be weak during the periods of calm; but, as the patient is intent on ruminating and thinking over his delirious ideas, he presents the type of the absorbed attentive subject. In such cases it is difficult to arouse the attention, which requires to be continually maintained; otherwise he will suddenly fall back into his usual silence and resume his ordinary suspicious and pensive physiognomy.

He lives apart from, and indifferent to, all. He does not exchange a single word with any of the other inmates. He has never shown the slightest sign of friendship for, or sympathy with, anyone. He has a brother and he has sisters, but he never speaks of them, never asks for them, never takes any interest in them.

He cannot understand why he is being kept in an asylum. He has never even suspected that his hallucinations and the resulting delirious ideas are a morbid product. He is absolutely convinced. To the great injustice that is done him by persecuting him in such a ferocious fashion there is added the other injustice of keeping him shut up in the asylum, so that he may be delivered, bound hand and foot, into the power of those who are tormenting him. Every time he sees me as I go my rounds I hear these words repeated: 'Send me away; do not be unjust to me. I am not insane; I have never done harm to anyone. I have no fault to reproach myself with. Give me my liberty.'

This man remained in the asylum in this condition for more than four years. There was no further modification or evolution of his delirium, and no transformation. There was no phenomenon of mental decadence. As he never managed to learn who his persecutor was, he remained in doubt and anxious to find out. Though he was strong and healthy, he always refused to work.

He was transferred to another asylum.

OBSERVATION XVIII.—K. Maria Luisa di Ferdinando, thirty-three years of age, single, born at Naples of a Neapolitan mother and a Swiss father, was admitted into the Naples Asylum on May 10, 1903. In the Questor's report it was said that Miss K. had been found in a grotto at Capodimonte, where she had been living for some days.

She herself tells that at the age of fourteen she used frequently to get up at night, and remain, for many hours, writing, putting the house to rights, or doing some other work, although the next morning she would have no remembrance of anything she had done during the night (somnambulism). Her father, for many years a sufferer from epilepsy,

was very much troubled about this somnambulism of his daughter, and consulted various physicians. We do not know what treatment they practised, but certainly in subsequent years she was not subject to these disturbances. The patient also asserts—and it may well be believed—that she showed notable precocity in her mental evolution. At the age of ten or eleven years she already understood a great many matters that her companions did not understand even at eighteen. She had a passion for literary studies, in which she would have perfected herself had her father and her grandmother not prevented her. She has always aspired to make herself independent, and to attain a position in which she should not require the aid of anyone.

A degree in literature would have conferred on her the independence that she sought, but, she says, her people opposed that course, perhaps with good intentions, but certainly with very bad effect, for her troubles are in great part due to her not having an independent position. Further, was it not a pity that all her *moral energy*, of which from her infancy she had given indisputable proof, should remain fruitless, whilst, had it been well guided or had only no obstacles been placed in the way, it might have borne fruit to her own benefit and that of others? (High estimation of one's own powers, the germ of megalomania). At the early age of fourteen she began to have a vague and indeterminate idea that some person or persons with whom she was in daily contact were persecuting her, or, at least, were out of sympathy with her and desirous to cause her trouble, to place obstacles in the way of all the manifestations of her activity, and even to bring her into disrepute. According to her own story, she has always had a certain clairvoyance that has enabled her to divine matters even though but distantly related to herself or her family. Once when her father received an anonymous letter which, as she says, contained very disagreeable matter, she thought that she could guess from whom it came; and from that time on she has suspected that a current of feeling hostile to herself was directed against her by a certain person and by a certain family. Until the death of her grandmother, with whom she lived, however—that is to say, until she had reached the age of twenty-seven—she had nothing more to complain of than the tacit opposition made by those of her own household to everything that she initiated—a species of passive resistance, quite invincible, that was opposed to her free activity. After her grandmother died matters began to become complicated. She had to return to her father's house, where she lived for two years in continual discomfort, sometimes being violently opposed by her stepmother. Her father was forced to seek a home for her in the house of a family in the Vasto quarter. There she lived in comparative contentment until she commenced to notice a very strange phenomenon: as soon as ever an idea was formed in her mind, she heard it repeated by the persons around her. We shall see how she explained the phenomenon to herself and how she adopted the theory of suggestion, which made everything clear to her. At that time, however, she was convinced that all the persons with whom she came in contact, known or unknown to her, in the streets or in the tenement where she lived, were one and all reading her thoughts aloud. This was a condition of matters that she could not bear, for it was impossible for her to keep anything secret. The profane eye was penetrating into the inmost recesses of her consciousness, and detecting the ideas that passed through it, the plans that were being matured in it, and the remedies that were perchance thought of. In this way the one thing that up till then she had thought to be most peculiarly and indisputably her own—namely, her consciousness—had become public property.

It seemed to her impossible that this state of affairs could last long, and, above all, it appeared impossible that she should suffer it for any

length of time. In the hope of escaping from what had become an absolute martyrdom, she changed her residence and left the shop in which she worked, but all in vain. Her brain continued to be like an open book which all could read. As the patient herself wittily expressed it, it was the only book that even the illiterate could read.

The idea then occurred to her to consult by letter a hypnotist in the outskirts of Naples, from whom she had already received various hand-bills. She applied to him, asking him to put her into a state that would enable her to resist this new and strange form of persecution, or to suggest a means of interposing a diaphragm between her thought and the clairvoyance of those who were reading it. She derived no benefit from this proceeding; on the contrary, she believes that the step she then took was fatal, because very probably the hypnotist, instead of assisting her, entered also into the plans of her persecutors. She changed her residence once more, but in her new home her thoughts were read just as before, and she finally decided to leave Naples and go to Palermo. The change of scene, however, brought no change of fortune. At Palermo she had no peace even for the first twenty-four hours. Her thoughts were read even more persistently than before, and her brain had not a moment's rest; for on the one hand she could not hinder the flow of ideas, more or less strange in character, that passed rapidly through her mind in constant succession, and, on the other hand, she could not close her ears to the voices of the persons who repeated to her what she was thinking. Then another strange thing happened. She applied to an employment agency to get a post as governess in some good family; the post was promised to her, and she was told to call again within a few days. She did so, but to her surprise she perceived that the persons in charge of the agency were making fun of her, putting her off from day to day with doubtful promises, and screwing up their faces in mimicry of her. She had a suspicion, which she thought was well founded, that her enemies had already been giving unfavourable reports of her; and so it seemed to her useless to prolong her sojourn in Palermo, where she had not found peace and had not succeeded in getting work. She therefore returned to Naples, and as soon as she reached that city she went to the office of the Questor to protest against, and to ask public protection from, that unworthy and inhuman persecution. One of the police officials advised her to live for a month in a house where he could look after her. She agreed, but not even in that house, under the very eyes of the Questor's officers, did matters change. Driven to despair by what was happening to her, and having lost all confidence in such assistance as could be obtained from the authorities, she thought of going away to some district with as few inhabitants as possible, where it would not be difficult for her to avoid meeting any human being. For some days she wandered about the lanes of Capodimonte, taking shelter at night in a sort of grotto, and having little or no food. In the grotto she was found by the police, and was sent to the asylum.

There she has behaved very well from the day of admission, although she has continually protested against the loss of her liberty, of which, she declares, no one had any right to deprive her. She displays intelligence sufficiently evolved and highly cultivated. She speaks and writes correctly both Italian and French. She has a slight knowledge of German. She has a very considerable acquaintance with history, and she shows that she has read many books. As to her own past, she can relate even the slightest particulars, and she discusses the details of her misfortunes with a wonderful wealth of argument. When she begins to talk it is difficult to restrain her, or to get her to change the subject of her discourse. She continues her reasonings without taking the slightest account of the interruptions and the observations of the interlocutors.

She distrusts everybody, including the superintendent and the physicians, in whom she had a certain degree of confidence to begin with. In the asylum, however, the reading of her thoughts has ceased. Since the day of her admission she has never again heard the echo of her ideas on the lips of others; but this, she says, is easily explained by the fact that her enemies cannot pass the threshold of the asylum.

She has changed her opinion as regards the thought-reading. At present she is convinced that it was not really a case of thought-reading, but of suggestion practised upon her by others. By the influence of a certain woman whom she considers to be her enemy, or of the hypnotist whom she once consulted, or of both together, all persons with whom she came in contact gained the power of imposing their own thoughts upon her at a given moment. It is not, as she formerly thought, that others read her thoughts; what really happens is that she is forced to think the thoughts of others. Thus she gets an explanation of how other people knew what she was thinking, and how she was unable to change the course of her own thoughts at will. From the last-mentioned disturbance she still suffers. If she commences to read a book, some idea quite extraneous to the subject she is reading will suddenly come into her mind and fix itself there so that it cannot be driven out. She continues to read, but does not understand; and if at any moment she thinks that she understands and reads further, at the end of the paragraph or of the chapter she finds that she has entirely forgotten all that she has read. Furthermore, the patient will not admit that this imperious idea that thus recurrently interrupts her reading may possibly arise spontaneously in her own brain. She is convinced that it is imposed upon her by suggestion. Not long ago she concluded a letter to the superintendent in the following manner:

‘At the moment I am writing the present note I feel myself being subjected to suggestion. Who is the person practising suggestion upon me? and how is it that he dares to take the liberty to make use of a person who does not belong to him?’

On this theme of suggestion she insists also in a letter addressed to her father. We quote here the most interesting part of it:

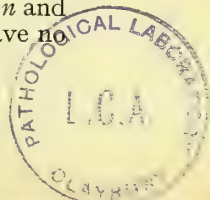
‘Dear Father, I should like *most urgently* to see you. The visitors’ room here is open from 10 a.m. till noon on Tuesdays, Thursdays, and Sundays.

I intend to speak on subjects that will not in any way be tiresome to you. I have written to the Consul asking him to protest against an abuse that is a blot upon a civilized age, but he takes no notice, so that I do not know what to think of his behaviour.

‘For the past six years I have been a victim of suggestion. I cannot at all understand how the person suggesting can take the liberty of imposing himself upon *me*, who am not dependent upon anyone at all. Not only that, but I should like to know what right a miserable police agent has to follow me about everywhere. I have no enemies, because I have never made any; and those few that I might have had were offended by others than myself.

‘With my own small savings, a little goodwill, and trust in God, I should have been able to solve that famous problem how to gain my livelihood *honestly*; but that *malignant genius* that has always presided over my destiny has once again crossed my path. . . .

‘I do not wish to be subjected to *suggestion*. I do not admit the will of anyone. I should like to know my *enemy!!!* If I decide to drop my name and my family like a *pariah*, I still wish to be certain of recovering that true liberty which every free creature has a right to claim in a country where there is liberty of *thought*, freedom of the *press*, liberty of *action* and of *speech*. Let them tell me who is my persecutor, and you will have no more trouble—neither you, nor he, nor I!



'I am suffering! The air of this place, the rules and regulations, and my surroundings, do not suit me at all. Here we are almost all poor people, and on the day when we leave we shall surrender in crowds, as the Milanese did when they went out of Milan, only we shall not have the rope around our necks unless we put it there ourselves.

'Comets drag behind them a luminous tail, but the falling stars press on and fall exhausted when they have no longer the force to continue their course.

'Why does Professor Bianchi take into his asylum people who are victims of suggestion, and treat them as insane? . . .

'For the space of so many years you have borne an enormous and heavy burden on your poor shoulders, being a poor epileptic; but my case is different. I have always had a certain amount of intelligence, and when I was little the correctness of my mode of thought astonished people! Dear father, I expect you on Thursday, and I hope that you will not fail me. On my part, I promise that I shall not give you any more trouble, and when I have learned the name of my enemy I shall annoy you no further.

'Who can tell who it is that is making me a victim of suggestion, and why he is troubling us?'

She is not given to religious practices, although she is a believer. She was brought up in the Protestant faith, to which she has ever adhered. She was never fond of company; her ideal was to be alone and independent. For that reason she has never even thought of loving a man (as a rule, congenital paranoiacs do not love). Matrimony never entered into her calculations nor even into the field of her views.

In the following observation I report an example of paranoia with delirium both of grandeur and of persecution, rapidly followed by mental decay.

OBSERVATION XIX.—Amal. R., fu N., of Naples, forty-one years old, bachelor, was received into the Provincial Asylum of Naples on October 23, 1897. We know little of his family history. Of his earlier life two facts of some importance are known—namely, that at twelve years old he suffered from the so-called 'chiodo solare,' or sunstroke, and that when he was about thirty he was tried and condemned to four years' imprisonment for fraud. He had hardly regained his liberty when he was taken to the asylum, suffering from a classic delirium of persecution and from very marked exaltation of the psychic personality, gradually developing into a concrete and systematized delirium of grandeur. In the very short interval between his liberation from gaol and his confinement in the asylum he had very little food, often being forced to live on a penny per day. The delirium of persecution had its origin in two real facts—his condemnation for fraud, and his implication in the case of the Banca Romana, having foolishly lent his name to one of the very numerous speculations by which others profited. As the result of his trial and imprisonment, he lost his former position as representative of a foreign commercial house. He became irritable and weak from the struggle that he consequently had in order to meet the wants of his daily life, and there arose in his mind the suspicion that his trial, imprisonment, and loss of position were the work of enemies. This suspicion became a conviction when he was confined in the asylum. The thing was perfectly clear: now that they had destroyed his honour and rendered it impossible for him to gain a livelihood, his enemies were putting him into a position that would prevent him from speaking. Who those enemies of his were he has never definitely

said. He has had his suspicions—perhaps they were the high personages implicated in the case of the Banca Romana—but he has never troubled himself very much to find out the names of his enemies. His own personal interest has been absorbed by another general question, more worthy of an intellect like his, and more fitted to move his noble mind—the question of the corruption of justice. His own case is a trifling and miserable incident which he would forget if the deprivation of his liberty did not constantly remind him of it. The essential fact is that there is no longer any justice in the world. I give below a few extracts from his numerous writings on this theme, which are full of, and indeed overcrowded with, high-sounding phrases and sentences and reminiscences of his own favourite authors :

‘ At all times and in all places it has been the custom to represent justice as a virgin holding in her hands a balance in stable equilibrium. . . .

‘ To-day the weight is on the side of gold or of iron, as in the days of Brennus !!! . . .

‘ O ye of little understanding !!! . . .

‘ From Babylon to Troy, from Troy to Rome, it was always for justice, for equanimity, for the sacred right of man to constitute himself into Societies, that fights were fought and the blood was shed of so many martyrs, so many heroes of the freedom of thought. . . .

‘ But to-day the words Law, Justice, Jurisdiction, Logic, Gratitude, Ethics, Rights, are one and all void of meaning.

‘ Luther, Calvin, Zwingli, the Council of Trent (and the last wonderful Council of Pio IX.) put an end to the abuse of thought, to the base bartering of conscience. But to-day conscience is subjective, just as Morality is subjective ; Abuse, Injury, and Oppression are tacitly sanctioned in the pages of the Codes and of the Pandects. . . .

‘ At the end of the Revolution of ’79 and ’93, with the Vandacci there came the Albigeri, but that did not put an end to those abuses and violations that for a time were called the “ Denial of God and the shame of the nations.” . . .

‘ Poor humanity ! It has fallen from the seventh Heaven, and we to-day from that height can perceive only Commercialism, Confusionism, and base trafficking in conscience. . . .

‘ What is the good of playing with words ? Intentions are too manifest and deeds are too clearly seen. Injustice wraps herself in a purple robe, and he who happens to be innocent is made to appear guilty. just as “ HE who was innocent of everything ” is ostracized and made the scapegoat, while malefactors receive honour and applause. . . .

‘ After the nineteenth century has run its course, or, better still, *au fin du siècle*, Justice is trafficked in and Judges are corrupted with money ; with good reason may WE say : “ Humanity is on the verge of dissolution.” . . .

‘ To-day the Auri Sacra Fames prevails over Justice.’

Note the expressions ‘ Judges are corrupted with money,’ ‘ Scapegoat ’ (which he misspells), and ‘ The innocent is made to appear guilty ’ ; these express clearly his conviction that he has been made to pay the penalty for others. Note the word ‘ WE ’ in large letters, with which he designates his own hypertrophied personality.

He shows no concern for himself, except in protesting against those who have deprived him of liberty.

‘ Because, in fact, though we had not a morsel of brown bread to appease our hunger, or a roof to shelter us from the hail and the cold, “ WE,” intelligent and free creatures, should become for ever rich, were justice to prevail in this kingdom, and were we in possession of our own proper dignity.’

The deprivation of his liberty weakens him physically, besides humiliating him morally :

' I feel myself oppressed beyond measure by the cruel vicissitudes of life, and my hand trembles as a result of the continuous imprisonment to which I have been condemned by the barbarity of men. . . . '

He does not always write, however, in this sad and almost resigned tone. Sometimes he is proud or even violent, especially when he writes to the ' Man-Superintendent ' and to the assistant physicians, who, he thinks, prevent him from leaving the asylum. Here is an example :

' YOU ARE MISERABLE WRETCHES ! and if insults were not the weapons of those who are in the wrong " I " should hurl a mountain of them, tens of thousands of them, at you. Of sufferings, moral and physical, of pinpricks and poor old women's tattle, of characterless individuals, I have now enough to fill all Italy. . . . '

All great men have been called madmen, and he among the others.

' Socrates, Confucius, Schiller, Columbus, Galileo, God Himself in the figure of Christ the Man-God, were honoured with a Crown of Laurel in being called " MADMEN." We, not to say I myself, have been honoured also by being called insane.'

When he saw that his protests were unheeded and that there was no word of his being allowed to leave the asylum, he began to think the world could not last with so much iniquity in it and such perversion of human justice, and that some day or other a general cataclysm would reduce it to dust. From the day on which that idea flashed across his mind he has been trying to find out from the movements of the stars and the variations of temperature and atmospheric pressure, the precursory signs of the cataclysm of the world, the date of which he fixes from time to time. Thus he has become an astronomer, and at intervals he sends out his bulletins. I give one of them here :

' To the Man-Superintendent and all the Doctors.

' Understand !

' Repetition is a good thing.

' General Bulletin For The World, to be issued regularly during the UNIVERSAL CATAclysm. The Faculty of Astronomy, Bacteriology, and Star-Meteorology (Ranieri Amalfitano fu Nicola) in the Nubilous and Nebulous system of charges and transferences :

' PREDICTS : To-day, 19th February, 1899, for 23rd February, 1899, THE DATE OF COMMENCEMENT OF THE UNIVERSAL CATAclysm.

' 19th February, 1899, continuing 1900, and becoming permanent in 1901.

' I, Faculty, call God only to witness.

' You, respectable spectators and spectatresses, also conscripts, have nothing more to do than to give me your courteous attention.

' ATTENTION.

' 5th October, 1899.—At Naples : Storm and thunder—Sky overclouded—Passing clouds—Sun at intervals of very short duration.

' 5th October, 1899.—Northern Italy : At Belluno, Udine, and on the Venetian Coast and neighbourhood, including Misurina—Storm and thunder at intervals—Banks of passing clouds—Opal sun at intervals during the day.

' 5th October, 1899.—In the district of Genoa, also at Monte Rosa and at the Picco di Tre Signori : Storm and devastation with thunder of short duration—Sun opaline—Sky cloudy—Zic-zac clouds.

' N.B.—Write Zic-zac with a " c " instead of a " g " : the reason is that the term is atmospheric.'

He continues in this way with predictions for all the towns of Italy and for all districts of Europe and America.

But his meteorological bulletins, his ethical addresses, and his apostrophes and imprecations soon became stereotyped. For the past three or four years, after a period of florid paranoia that lasted a little more than two years, the patient has invariably repeated himself in his discourses and writings. No matter what the question put to him, his answer inevitably commences thus :

'From Babylon to Troy, from Troy to Rome, it was always for justice, for equanimity, for the sacred right, etc. . . .'

Then he goes on : 'Luther, Calvin, Zwingli, etc.'

When he gets out of this tangle, not a word of his speech can be understood, so great is his intellectual confusion. I give here an extract from a recent discourse, as it was taken down in shorthand.

After the usual 'From Babylon to Troy, from Troy to Rome,' etc., he goes on :

'To whom would you give an Astronomical Observatory if not to me ? I challenge anyone ; I know everything about the subject. My Bulletins prove it. The madness of this world has prescribed for women Riding Shoes, Black Merino Gowns, Scarlet Belts, Ornamental Insteps, Gold Lace, Tight Waists, and Astronomical Caps. This is the present fashion, as a neighbouring Outfitter, Canestrelli, has known ever since 1892. One open-work Black Straw Hat, triangular and cocked, Lire 36. That is the feminine Astronomical Cap. Fashion for women of the ordinary ranks : Scarlet Dress with mantelet ; Bodice with Yellow Breast and Scarlet Trimmings. In summer they should be dressed in lily-white or lilac. The figure X in my Bulletin is for the horizontal, and the breasts are scarlet, having maps—that is to say, handkerchiefs that can be worn on the chest. For men, garments of Black Cheviot, Scarlet Sash, Black Straw Hat with Scarlet Ribbon or the Astronomical Cap *à la* Ranieri, such as is worn by an Engineer who comes here.'

All his mental faculties are reduced to this fanciful nonsense. The affections of the patient are almost dead. He has a vague, faint, and colourless recollection of his mother. He never troubles about his relatives, does not know whether any of them are alive, and says that in any case he has no need of them.

Religious paranoia has become very rare. In comparison with the deliria of persecution and of grandeur, which are the echoes of the stronger emotions that stir the modern mind—the desire for fortune and enjoyment, and the fear of not attaining these owing to the endless difficulties met with in the social environment—religious delirium is ever becoming rarer in proportion as the aspiration of man towards the Divinity disappears from amidst the masses of the people, and as the reality of life takes a greater hold of the mind than the hope of a supernatural Paradise. Amongst the Italians, religious belief has been much weakened and the animistic trend of the mind is interfered with by the pressure of life. Religious paranoia, therefore, is rarely seen, even in so large and populous an asylum as that at Naples. This fact is a further proof that the deliria of paranoia strike their roots into the actual currents of popular thought and belief, not into those that have completely dis-

appeared even from the lowest social strata. For a like reason, lycanthropy has disappeared, and the legend of the werewolf furnishes very few cases indeed.

The religious paranoiac is usually a mystic megalomaniac. He passes through a period of asceticism. He goes to church a great deal, listens to the sermons, confesses often, takes the Communion, fasts, and inflicts punishments on the flesh in every conceivable manner in order to purify himself of some fault of adolescence. If he is illiterate, he concentrates all his attention on the images of saints, either at home or in church. His whole life is centred around them ; his imagination becomes exalted by gazing upon and kissing them. A species of intense fetishism gives the intonation to his psychic being. By degrees the subject loses his contact with reality, neglecting his duties for religious exercises, and becoming at first indifferent, then haughty and intolerant towards his family. His affection for the persons dear to him is at first weakened, then disappears entirely, its place being taken by complete indifference. His nutrition is undermined by fasts, but at the same time a sense of spiritual comfort masters him, a great hope and a profound consolation encourage him to persevere. He knows that he is understood, and he is sure that his prayers are heard by God and the saints. An inward spiritual joy detaches him more and more from the pleasures and relationships of worldly life.

Meanwhile, sensory disturbances begin to make their appearance. He imagines that he sees some new feature in the physiognomy of an image. Christ has made him a sign with the head or the Madonna has moved her lips or made a sign with the eyes—there is now no doubt of that. His dream has been realized, and already he is in direct communication with the saints in heaven. To these illusionary disturbances, produced by the ordinary mechanism, there are added auditory and visual hallucinations. In most cases visual hallucinations predominate. The images to which the fervent prayers have been addressed for months past appear to him—first in sleep as a rule, and afterwards when he is awake. They do not speak, but should they do so their words are an encouragement or a command. These apparitions, or, rather, visual hallucinatory images, however, are sufficient to definitely confirm the delirium. He is the Elect of God, the Word Incarnate, the Messiah, the New Messiah, the Christ, the Antichrist.

There is an easy progress from the delirious conception to some particular attitude, and from that attitude to conduct. Life becomes manifested in terms of the new ideas, and, according to individual tendencies, we get the preacher, the hermit, the reformer, the dispenser of grace, the worker of miracles, the inspired one, or the diviner of the future.

If the delirium develops in an educated subject who is much given to study, all his talent and all his culture are, by a process

of unconscious cerebration, put at the service of the new ideas, which he maintains with great wealth of argument, and with keen and inexhaustible dialectic power. He has a conviction against which the weapons of logic and culture, or the authority of any alienist are useless. The transformation of the personality in the direction of religious and political reform follows as a fatal necessity. The social problem, which holds the attention of men's minds much more strongly to-day than it did in the past, plays its own part in the evolution of religious paranoia, and the delirium of the primitive and uneducated subjects, which is exclusively mystic, becomes a mystic humanitarian or social delirium in this second class of sufferers.

Here also the evolution of the delirium is more or less slow. Above all, if those hallucinations that always hasten on mental decay should intervene, the simple reformer loses his last points of contact with reality and with his intellectual patrimony, such as it was prior to the malady, and becomes the Messiah, God, Christ, the Lord of the world, etc. In these cases, as a rule, no true delirium of persecution is developed. What we get are rather persecutory episodes determined by the calamitous circumstances in which the life of these delirious subjects is passed. Sometimes they meet with sympathy in the popular mind, as happened in the case of Davide Lazzaretti, to mention one recent case ; but for the most part they encounter derision, hostility, and opposition, that furnish elements to the delirium of persecution. The following clinical report is of more value than any description :

OBSERVATION XX.—Carlo Is. di Luigi, of Rome, bachelor, student of literature and philosophy, was admitted into the asylum of Naples for the first time on September 17, 1898, when he was aged twenty-four. He had been suffering from hallucinations of hostile content, and he declared himself to be a victim of suggestion made from a distance, although he did not well know who was the author. He added, further, that certain of his friends, at a dinner that had been given him a few days before, had put a large quantity of bromide into the wine.

We have been able to find out hardly anything of his family history. From his own personal narration the following has been ascertained : He has always been of delicate health, a keen student, but easily exhausted ; he had a high opinion of his abilities, and in the depths of his mind was really proud, but he cleverly dissimulated the exaggerated idea he had of his own importance. He was affectionate towards his parents, attached to his home, avoided companions, whether good or bad, and was fond of solitude. Why he avoided companions he is quite ready to confess to-day, now that his delirium of grandeur is fully developed : he considered them of small value in comparison with himself, and he was afraid that they were hostile to his grandiose projects.

From these details of his previous history and from what we have subsequently learned from him, it is clear that originally he was proud, vain, and given to dreaming. The delirium of persecution arose secondarily, and was nourished by the presentiment he had that those about him would be hostile to his designs, and also by the subsequent acoustic, optic, and gustatory hallucinations.

During this first period of his life in the asylum, lasting less than two months, the ideas of grandeur that occupied his mind could only be inferred from his attitude, from some faulty phrase, or from some word that escaped him unawares. He was still very prudent, and had sufficient judgment left to understand that the proclamation of these ideas would prolong his confinement in the asylum. He would not commit himself by speaking of anything beyond the persecution that he had suffered, in proof of which he could bring forward evidence, the principal argument being that he had been arrested by the police and taken to the asylum.

The following letter is one in which he asked for his discharge. We reproduce it in order that it may serve also for comparison with what he wrote during the second period of his life in the asylum, the style of the latter compositions being completely altered :

‘ EXCELLENT SIR,

‘ Of myself, and supported by the judgment of several medical men, I can assure you that I am far from being affected by delirium of persecution or by any other form of insanity ; but that, as the result of real persecution, which I now dismiss from my mind, I have been reduced to such a condition that it has become much easier to make me the victim of suggestion than would have been possible under other circumstances.

‘ Again, to any person who may object that for that very reason it is necessary I should remain in the asylum, I would reply that, owing to my habits and to my psychic nature itself, it is much more probable that if I am not sent to *my own home* as soon as possible, seeing that I cannot sleep here, cannot accustom myself to my surroundings, and am deprived of the conversation and the sight of my parents and friends—it is much more probable, I say, that my mental organism will degenerate under this enforced imprisonment more readily than it would within the walls of my own home.

‘ You may deal with this letter as you think best : I merely wish to warn you.

‘ Accept my respects, which I have pleasure in tendering you.

‘ Your most devoted,

‘ CARLO IS.’

Note should be taken of the phrase ‘ I wish to warn you,’ by which he intended to warn the superintendent of the asylum to be careful not to abuse a man of such importance as he.

He left the asylum greatly improved on November 7, 1898, but returned on February 17, 1901, after having caused a great disturbance at the University, where he used daily to insult Professors and students, interrupting the lectures and claiming that he should be allowed to take the place of the Professor and teach the young men the true science, *the doctrine revealed by God to Carlo Is. of Rome.*

In a journal for May, 1901, his morbid personality is thus delineated :

The most notable mental disturbances of this patient are in the purely intellectual field. He has a very pronounced delirium of grandeur, with vast ramifications, thoroughly organized, reinforced, and increased by the continual flux of anomalous products. This is the fulcrum of his diseased personality. He is the greatest genius on earth, the Elect of God, the Anointed of God, the Redeemer of Humanity, the one who is to bring perpetual peace on earth for the happiness of mankind.

It is only a short time since he came fully to understand himself, for God, before revealing Himself to him, wished to try him by long and severe affliction. The school of suffering—that suffering which, as a young man, he learned to love in the lachrymose pages of Giacomo Leopardi, was the

first preparation required for the revelation of the Divinity. His acute mind and his hypersensitive spirit always caused him to feel keenly the vulgarity and baseness of those in whose midst he was often condemned to live. At the age of sixteen, when a student in the Lyceum, he felt a great and tormenting ambition to become a conqueror in arms and a ruler of nations. But what a contrast between the external world and the world of his thoughts ! To attain his destiny, he would have required a race of heroes, and in reality he saw himself surrounded by companions who were pusillanimous, ignorant, incapable of understanding him, and who often mocked him. He felt that he was alone in the world—alone with his dreams and his winged hopes.

He was, however, tranquil in his solitude, and would have awaited the ripening influence of time with all due calm, if shortly afterwards an irresistible and unheard-of persecution had not been commenced against him. Unknown persons would sometimes meet him and make faces at him ; at other times they would come under his windows at night and wait for him to show himself, so that they might insult him ; or, again, they acted upon him from a distance by means of electricity and magnetism. This persecution continued without interruption for two years. Although a profound scrutator of natural phenomena, as he likes to call himself, he could not understand what was happening in and around him ; and as he had never done harm to anyone, he was unable to discover any reason for this collective conspiracy against his peace, his studies, and his very existence. He could not admit the intervention of supernatural causes, because he did not believe in the supernatural. He was an atheist, and his atheism arose from the fact that he could not conceive of a Deity, an intelligent agent, outside of Nature. However, as his studies in metaphysics gradually advanced, his idea of the Divinity gradually became more and more detached from the anthropomorphic personification presented by the various religions, and with him it became more and more completely identified with Nature, until this formula, which is to-day the first dogma of his catechism, burst forth from him, ' God and Nature are identical.'

If God and Nature are identical, if God is present in all natural phenomena, and if those phenomena are God Himself, then he could not admit that the persecution of which he was a victim could be carried on *without the knowledge of God*, and much less, therefore, against the will of God.

Accordingly, the persecution of Carlo Is., being a natural phenomenon, was by God Himself, or, as we may say for convenience of expression, it was brought about by Divine suggestion.

When he had come to understand this supreme truth, which came to him, as he says, through his sufferings, he at once deduced from it the corollary that God wished to punish him for the *illusion of atheism* in which he had lived, and if God had not allowed him to perish like so many other mortals who lived constantly in a state of *delinquency or folly*, that was as much as to say that our subject was a privileged man, one of the elect of God. When his thoughts had taken this direction, the persecution terminated ; then a second period of hallucinations commenced. This he calls the period of ' Divine Revelation,' but it might better be termed the period of ' Annunciation.' Conversations commenced, when he was awake or half awake, with blessed spirits, with the souls of the great departed who had best invoked the Divinity, when on earth. These spirits appeared to him and spoke to him, although sometimes he heard their words without seeing them. He does not repeat the speeches that they addressed to him, but he points out that the mere fact of the apparition of beings so near to God signified that God was coming near to him, and that God was initiating in Carlo Is. a process of deification, a course that would render him Divine. After the blessed spirits came the saints. He

remembers, among other incidents, that one night he was assisted by San Gennaro, who called St. Peter and St. Paul to his bedside, along with some other saints whom he does not remember. After the saints there came a winged messenger, the angel Ariel, as an intermediary between God and himself. At that time he began to write a book about the hierarchies, in which he meant to treat of saints, angels, seraphim, and cherubim. At this point his maturity was complete, the extreme limit of his perfectibility was reached, and accordingly the great annunciation was made. The sound of a trumpet was heard, and above it he could discern clearly the words, 'Thou, Carlo Is. of Rome, art anointed of God.'

From that day he has spoken only the word of God, and he writes only to Divine dictation. All his actions are inspired by God, are God Himself, even the Divinity rendered tangible. His mission, as the Anointed One, the Messiah, is to redeem the human race from the *state of delinquency, folly, and anarchy* in which it now is, and to bring about



FIG. 80.—CARLO IS. OF ROME, RELIGIOUS PARANOIAC.

perpetual peace, the conditions of which he has codified in a species of constitution containing seventy articles. The first necessity for the attainment of perpetual peace is that he, Carlo Is. of Rome, should ascend the throne of Italy, and that Victor Emmanuel should leave it, either by voluntary abdication or as the result of a popular revolution. God will take care to 'suggest' abdication to the King or revolution to the populace. Under the reign of peace, the new social system will be based on the following fundamental politico-economical principles :

Abolition of private property, which would devolve to the State, the State providing for the necessities of each individual.

Absolute equality between man and woman.

Matrimony to be tolerated, although it represents a form of slavery.

Moral and social rehabilitation of the important and beneficent institution of prostitution.

Abolition of the hereditary monarchy, and popular election to all public offices, from town councillors to the heads of the national policy.

It would be sufficient to apply this régime in Italy, and all other nations would feel the necessity of imitating it. The boundaries between States would next be abolished; the whole world would become one single State, and Carlo Is. of Rome would have the undisputed sovereignty of it.

Such is the genesis and the structure of his delirium, which completely transforms his personality and enslaves his whole patrimony of culture. Everything that will not serve to augment his own morbid personality is denied by him. All the sciences are false—they are simply pretensions to science. History is unworthy of credence, because *everything is doubtful as regards the past*; literature alone has some importance in the formation of the sentiments.

With regard to the theme of the worthlessness of all the sciences, he has written very largely in the asylum. His clinical record is interspersed with many of his productions in writing. I quote the following examples:

‘In psychology scientific observation is impossible

‘we distinguish the observation that the psychologist makes upon himself from the observation that the psychologist makes or ought to make on other anthropic individuals.

‘The former is termed, in a conventional way, “introspection.”

‘it is clear that introspection is easier for those psychologists who are self-observers.

‘observation of others always presents greater difficulties, even putting aside the cases of observation of those not present, the psychology of illustrious men, etc.

‘to state why psychic observation, conducted with that rigour demanded by science, is an impossibility, is to state in great measure why science itself is impossible.

‘although a single reason may be sufficient, viz., the image-creating value of a human word, it will be advantageous to adduce, not an initial series of the infinite series of reasons, but a few other essential reasons that will corroborate the allotropic state of the *psyche* of the reader who is practised in those studies called scientific and has been deceived by the presumed sciences.

‘to eviscerate the subject of the entity of the human word is to devastate and ruin the scientific field hitherto cultivated in the human monad by false views which are, however, rendered alluring by the very powerful witchcraft of illusions.

‘in fact, hypotheses often become theses, and when they have become theses they often become hypotheses over again

‘these farces are due to the varying powers of reasoning of the different writers

‘since a great reasoner, of homogeneous culture, can always confute a minor reasoner, and that in psychology and in every other study. . . .

‘and I affirm that, as psychology is an absolute requirement of science, so is it with psychiatry

‘the normal psyche is not to be scrutinised by science, and therefore the diseased psyche is also inscrutable to the inquiries of science

‘the psychologist knows nothing whatever of psychology and the psychiatrist nothing whatever of psychiatry. . . .

‘amid the contemporary illusions of science, either of the mathema that is not mathematical or of the scientific nature of science, it is clear that some psychiatrists may fall unconsciously into the error of declaring insane a person who is not insane

‘that is hurtful to the individual as far as regards the contemporary social organization

' what is the nature and extent of the crime of such a declaration, made perhaps consciously, but under an illusion, and therefore unconsciously, in this daily presumption of being scientific ; and whether it be a crime or not, whether it be or be not to such and such a degree in accordance with the will of God, is not declared ; but it is certainly regarded as a criminal offence that the only man of God, Carlo Is. of Rome, should be able, by the will of God, to express the judgment of God, who does not impugn, either by himself or by His elect, the integrity of the psychiatrists, to whom it is already painful enough to fall below the scientific character of their teachings . . .

' what applies to the individual applies to the State . . .

' in the social equilibrium which will be established by my peace, contemporary science will constitute the historic content of culture, it being necessary to collect it, to weigh its worth, and to reduce it to its minimum after the return to God, and after receiving the direct revelation from God, the order of composition being according to one of the notes of my peace, in my fashion

' it is asked whether he who liberates the human race from the torture of mental slavery and from the evils that follow upon it, allowing the conditions for the purest blossoming of the mind to come into force, be or be not the Saviour ; and it is hoped that into him will not be driven the supposed nail from the supposed cross of the supposed Christ.

' I shall continue to-morrow to write about the circumstances that prove me to be the Saviour of the human race and—I shall not say as a consequence, but by precedence—the Christ of God, and therefore necessarily the Sovereign Arbiter of the human race.'

As will be seen, he speaks of a *supposed* Christ. It is important to note how he judges of the historical personality of the Nazarene. In his view Jesus never existed at all, either as man or as the Son of God. He was simply a phenomenon—Jesus. The apostles, the disciples, and people of Judea and of Galilee, acting under the suggestion of God, believed that they saw and heard Jesus, but in reality they neither saw nor heard anything at all. It was simply a matter of optic and acoustic hallucinations. The Word was not made flesh, and God did not become man in Jesus Christ ; but He produced these phenomena in order to teach a new morality to the world. The first personality really *assumed* by God is Carlo Is. ; and God has promised that after him there will never be another Messiah on earth.

He cannot, however, fulfil his mission as Messiah within the walls of the asylum, and therefore he daily protests against his confinement, and sends out his orders in the name of God :

' it being understood that men have to be men and not slaves ; and it being once more declared that Carlo Is. of Rome has not the power of thought-reading

' that being, as they would understand it, a vice

' and the said Carlo Is. of Rome, having been detained in an asylum from the 17th day of February, 1901, as insane

' whilst he is the only man truly rational

' being the anointed of God

' and Carlo Is. of Rome having been verbally declared insane by ignorant people on 4th May

' and it being added that Carlo Is. of Rome

' should remain in the asylum until the time of his supposed cure which would be the greatest folly

' delinquency or anarchy

'and the scientific character of psychiatry having been already declared to be null

'God commands through Carlo Is. of Rome

'that Carlo Is. of Rome be immediately restored to liberty as the assumed of God, and heir to the throne

'and that he be liberated on the 4th May, 1901, the throne being ascended on 19th May, 1901

'If not, in the universal madness,

'the whole of Italy shall be a sea.

'Naples, 4th May, 1901.'

At present the perceptive process is disturbed by hallucinations and illusions. He hears the voice of God which dictates to him ; he measures the velocity of God by meteoric phenomena ; he predicts storms, cataclysms, etc. He has a ready and retentive memory. He remembers to the smallest details facts affecting his own personality, even when he tries to go back to his infancy. His attention is always alert.

As to his sentiments, it is important to note that he never received any religious training in his family. His maternal grandfather was persecuted and martyred by the Pontifical police, and his mother, who never goes to Mass, told him the story of those persecutions, and filled him with scorn of everything that had anything to do with ecclesiasticism. From men to the principles that they represent is a short step, and the transition from anti-clericalism to atheism is easy.

He is affectionate and respectful towards his parents, and he would feel it his duty to assist them should they require his assistance. Occasionally he has suspected that he might be of some other origin, but, as he lately learned from God that he is descended from an Etruscan Lucumone, and as his mother's family was originally Tuscan, he has no longer any doubt that his parents are really those whose names appear as such in the register.

He has never experienced love for a woman in any of its aspects. Up to his present age he has never felt sexual impulses. It may happen that, after the peace has been realized, God will allow him to have a wife.

In the asylum he behaves quietly.

Paranoia Erotica.—This must be understood as merely an insufficient and abnormal psycho-somatic development. Considered in its harmonious and complex structure, it occurs often in individuals of defective sexual life, not much inclined to copulation. Sometimes the subjects are old maids who have never had an opportunity of marrying, and never even possessed any of those unconscious qualities of attraction that arise from harmony of spirit in one whose normal instincts, tempered by education, are summed up in charm of look and conduct. They are eccentrics, dreamers, idealists, indifferent to passion, and pass their youth chasing the *ignis fatuus* of fancy. In most cases sexual desire is absent, and never do they find among their acquaintances the man upon whom they can exercise the fascination of love and the desire that lead two souls to unite. They read romances and expend their powers in the realm of chimeras, and the more these participate in the structure of their minds the more they are removed from reality, and the more fully do they lose possession of those intellectual or instinctive resources (supposing they once had them, even in a

slight degree), by virtue of which the normal woman succeeds in realizing some of her objects. As a rule, they give themselves up to an ascetic life.

In other cases, although more rarely, the sexual desire exists and torments the subject; but domestic circumstances, education, timidity, or ugliness conspire against the poor woman, on whom no one ever casts a glance of love. Sometimes they are widows whose sexual relations have been very limited and unhappy. They lost their husbands very early, and Love never smiled on them again.

All of them have nourished a dream, a vague, indefinite aspiration for a long time. They have never known the man of their hearts, or he has been merely a fleeting apparition. Their dreams and aspirations have remained concealed amidst the turmoils of this life, which continues inexorably on its parabolic course. Adaptation to new circumstances chokes off those ideals that have not been realized. Youth is spent, for the most part, in sadness and solitude, the decline of life draws on apace, and the helpless mind is afflicted with profound sorrow. Just as the sailor, when he is driven farther and farther from the land, clings to a last illusion that he will be able to set foot on shore again, so the timid dreamer of the dreams of love illudes herself that she will finally attain to her supreme joy, the love so long sighed for. He will be a handsome youth, a personage of importance in politics or in science, some prominent personality. Then commence the declarations, the letters, and the persistent, annoying, and protracted visits. Nothing will restrain these subjects. They claim that they have the right to love, and to be loved in return. He who replies to one of their letters is lost, for documentary evidence is there, and the broadest illusory interpretation is given to the coldest and most measured communication.

They declare that they love, that they have the right to manifest that sentiment, and to be loved in return. They maintain this right of theirs with a wealth of argument. A lady who had been a widow from her youth, neuropathic, and with many psychosomatic degenerative stigmata, said to a married friend of mine: 'I know that you are married, but as I love you, and have your assurance that you love me, I know that I am not wronging your wife in any way. Even supposing she should become aware of our relations, she will understand that this is simply a noble affinity of sentiments between you and me, and she will have no reason to object to it. Understand this: I must love you, see you, and hear you utter an expression of love. You love me very much; I know it, and have no doubt of it.' This poor man had to suffer the torture of protracted visits and of stereotyped speeches, whilst the lady threatened to commit suicide if he refused her the indispensable comfort. She believed she had the right to

love that man, and the right to his love in return. She had the conviction that he loved her, and could see no reason why he ought not to love her. She thought that she was not giving any cause for offence to the wife of X., and she made it plain that she considered herself to have a preferential right over his wife. She did not understand the delicate position in which she put Mr. X. with respect to his own family and his wife's relatives. There was no question of sexual relations.

In this case there was no sign of illusions or of hallucinations, for this form of paranoia is developed exclusively in the intellectual field. Notwithstanding the severely correct behaviour of Mr. X., no idea of persecution appeared for many years to modify this clinical picture.

In another category of cases, the erotic delirium is followed by the delirium of persecution. Here is a short example selected from my observations in my private clinique : A young woman of about thirty-five, after waiting long for a husband of some sort, began to become pensive and gloomy in disposition. She neglected her domestic duties, frequently shut herself up in her own room, and sometimes behaved towards the rest of the family in a strange and unusually high-handed manner. She dressed in an exaggerated and original style. One day she was detected in the act of posting a letter to Mr. X., a young man belonging to the district, who had been away from it for some time, and who had formerly visited her house. The letter was full of ardent phrases, as though the two had been lovers. When questioned, she declared that she had proof that he loved her and wished to marry her ; that she had learned it from his words and from signs ; that he had appeared to her in a dream, and she must of necessity marry him. The clearest proof that he had never thought of contracting matrimony or even of giving her any indication of such an intention was laid before her, but all to no purpose. She had a conviction to the contrary, although absolutely without grounds, and when she found that the members of her family quite properly opposed her intention she developed a florid delirium of presecution, taking up an attitude of hostility and violence. The family made a last attempt to remedy matters by inviting Mr. X., who was a far-off relation, to come and stay with them, and try to persuade the young woman that her ideas had no real foundation. Mr. X. came, and made her the most explicit declaration that it was quite impossible for him to enter into matrimony. He proved to her that she had made a mistake, and that it was a dream, and nothing else. Notwithstanding all this, her two deliria remained unaltered. She must marry Mr. X., who loves her and desires her to be his wife, and it is the members of her own family who hinder her from doing so.

In another class of cases, which are much rarer, there is a delirium of erotic persecution *from contrast* of thoughts or tendencies.

The subjects are usually old maids and lascivious men, who always present some anomalous features and grave hereditary neuropathic taint. Their delirium takes the form of a belief that they have suffered, or are threatened with, carnal violence. Such delirium is the result of dreams or of true hallucinations or illusory interpretations of anomalies of the kinæsthesia in the sexual sphere. In all these cases we have to deal with individuals whose mental life is centred in erotic images and ideas. The priest Potenza killed his old landlady, who had always refused his advances, because he was convinced that she had had him constuprated by her dog whilst he was asleep, with the object of doing him the greatest possible injury. A woman who was in the asylum for many years was always to be seen leaning against the wall with her left hand over the region of the anus, for fear she should be abused pederastically (conviction or hallucinations).

A distinguished lady, over thirty years old, of robust health, and highly cultured, conceived the delirious idea that she had been the victim of incest on the part of her brother. She had seen him one night on her bed, and had been conscious of sexual sensations. She had no doubt at all that her brother had had intercourse with her, although he was really abroad at the time. When she came to Naples to consult me she expressed her conviction that her brother was in Naples, and desirous of continuing to vent his sexual instincts upon her. It was impossible to persuade her to the contrary. This lady came from a district where incest is very common.

We distinguish, therefore :

1. An erotic paranoic character (erotic paranoidism).
2. Simple erotic paranoia.
3. Erotic paranoia with delirium of persecution.
4. Erotic paranoia through contrast.

The following summary of a case is characteristic, and may be compared with the progressive chronic delirium of persecution :

OBSERVATION XXI.—Or. Bart., fu Francesco, fifty-one years of age, native of Fossano, in Piedmont, but resident in Naples for many years as an employé on the Crown-lands, was admitted into the asylum of Naples on November 7, 1902. The circumstance that induced the police to take such measures with him was the fact that he had sent a series of love-letters to a young lady belonging to high society in Naples, with whom he was and is still enamoured, and whom he believed and still believes to return his feelings.

According to the assertions of our patient, there had been no neuropathic subjects amongst his antecedents. We are aware, however, that his father died very young. He himself presents certain anthropological signs of degeneration of some importance—occipital plagiocephaly, cranium flattened behind; slight hypsicephaly; lop-ears, especially the right one; genitals very little developed; penis infantile; left testicle of the size of a large pea.

He himself tells us that the story of his sexual life is very poor. He has not approached women more than four or five times, owing to fear of contagion and because he wished to take care of his health, so that he might live a hundred years. The truth is that he has never felt very strong carnal stimuli; on the other hand, he has constantly fallen in love with ladies superior to himself in social and economic position.

His love episodes have always been of a platonic character, and are to be counted by the dozen. He is now fifty-one, and as he remembers these incidents, he is astonished that none of them ever ended in matrimony. For a while he believed that God was making sport of him, causing him to fall in love time after time, and denying him all possibility of contracting matrimony in any case; but maturer and more recent reflections have led him to a different conclusion—namely, that his previous adventures in love were nothing more than a necessary preparation for the present case. This is the strongest, the only really strong passion, he has had, and if it has not a successful issue he feels that he cannot survive it. ‘Marry or die’ is his motto to-day.

In proof of this, I reproduce here a portion of a letter that he addressed some time ago to the lady in question:

‘I have said that I have always been rather indifferent to matrimony because I thought only of my health, and my principal object in life was, and is, to indulge in few or no enjoyments and to live a hundred years, with the aid of special study and a special system of hygiene which I have myself devised. As for the rest, it seems to me that I have not been master of my will, but simply one of God’s toys, a new plaything with which God amuses Himself, causing me to fall in love so many times, while I have never once managed to arrange a marriage. It seems as though God intended to say to me every time I fell in love: “Yes, yes, thou art in love, but thou lovest not yet enough. . . . Wait, wait until I send thee another angel, much more handsome and much more wonderful than any of the previous ones, and then thou wilt see how much thou wilt love, thou wilt see that thou wilt truly love.” And now, behold, after having been so often in love, both in the past and within recent times, hardly did you appear before mine eyes on the Piazza Vittoria, on that fine April day, before I felt an unusual attraction that drew me towards you in an extraordinary fashion. I have been following you and waiting for you for ever so many days, and, in short, I love you with a love that is greater and more powerful than ever love was before, for it has reached that point in which there is nothing left for me but to marry or to die. . . .’

In this manner his present passion arose: On the Piazza Vittoria he saw, in her carriage, a handsome young lady belonging to the aristocracy. He fell in love with her, and, believing that she returned his affections, he wished to marry her. The conviction that the lady was in love with him was so deeply rooted that, a few days after his admission to the asylum, he wrote to his own sister as follows:

‘DEAR SISTER,

‘I am at present in an asylum owing to love troubles, but I hope to leave it soon and to marry a beautiful lady. I have to ask you to go at once to the registry office, and to get them to make out a certificate declaring that I am free to marry.’

But what are his proofs that the lady is in love with him? He has simply seen her, but has never been able to speak to her. He has often walked to and fro underneath her windows, but without receiving any sign from her. He has written an infinite number of letters, but one and

all of them remain unanswered. That ought to be sufficient to lead to a negative conclusion, but it is not so for our patient. He believes that he possesses—perhaps in compensation for his ill-developed genitals—a special fascination, in virtue of which no lady can resist him. From his boyhood he has always been a fascinator, a bewitcher, an enchanter. Ladies have always been falling in love with him, and it was not their fault that he did not marry any of them. It was the doing of God, who desired to preserve him for a stronger love, for a higher union, or, as he writes, for ‘the fusion of two great souls burning with love and delirium, who will prove to the world that no happier passion can be experienced than that of their ardent and immeasurable love.’ If no lady has ever been able to resist his fascination, then neither can she who is the object of his present love, and that is an axiom admitting of no possible doubt. But he has still further proof. He is always writing letters to which he gets no direct replies. That, he says, is quite natural, because the lady is not at liberty, being closely guarded by her parents—those very parents who have had him shut up in the asylum. He, however, finds her replies among the correspondence on the fourth page of the *Mattino* and in the ‘Piccola Posta’ (or Agony Column) of *Gibus* in the same paper. Everything he finds there that could possibly have any bearing on his own case he interprets as a reply from the lady. Of course, he selects only those communications that are favourable; the others, he says, do not concern him. He has a wonderful confidence in the ‘Piccola Posta’; for him it is an infallible code of love, from which there is no appeal.

Then, he has also dreams, in the testamentary value of which he has a very strong belief. Here is how he writes about them to the lady :

‘Do you believe in dreams, O Signorina Amabile? Certainly I do, for they are the true expression of the soul, and, indeed, I firmly believe that there can be no love without dreams, for they bring up the vision of the beloved being and of everything that relates to and touches upon his love.

‘Well, then, after so many other dreams, I had to-night the fairest dream that I have yet had or that ever I can have in all my life. . . . I dreamed that, whilst I was thinking of you and you were awaiting a final decision, I received from you a letter containing nothing more than one single word, a simple word but eloquent, and that word, which could be read in the middle of that note in large and shining characters, was this : “Matrimonio.”’

The significance of this dream is clear and unmistakable. He is therefore loved by the lady, and must get out of the asylum in order to marry her. As, however, his liberation is being delayed, he invokes the assistance of the lady, who could hasten it with a word :

‘For forty days I have been in this asylum; but while asylum it may be for others, it is not so for me and for my love.

‘Forty days have passed and I am still in this hell, powerless to rise to that desired and longed-for paradise, which is yours, O Signorina Amabile. For forty days I have placed before these professors of ours a problem that is as simple as it is natural, saying to them : “Think, sirs, that I love my lady, and ask you for nothing more than to set me free to marry her.” It must now seem to them a crime if my liberation from this hell be longer delayed, but up till now nothing could induce them, and why? Because, they say, you do not love me at all, and I cannot give them any proof of your love.

‘In such a difficulty I must invoke your measureless bounty of love, which I do not and never have doubted a moment, and I say to you

with the greatest bitterness, O Signorina, let my liberation come soon, so that I may fly to you and prostrate myself at your feet, begging you to bestow on me, with the supreme bond of love, which is marriage, the great happiness that I await from you and that none other can or ever will be able to give me, because, as I have always said and as I now repeat, you are the most beautiful of all the angels that God has ever sent me.'

Thinking it quite impossible that the lady could fail to be interested in his liberation, or that she should fail to take some practical steps to hasten it, he came to the conclusion that the greatest obstacle was offered by the doctors in the asylum, and to them he wrote the following letter, wherein, besides his exasperation, we can note the feelings of a hypertrophic personality :

' I have no longer courage to insist, for suffering is always silent when the pain is great ; I shall only say, " Put it to your own conscience, and remember that the greatest cruelty in this world is the condemnation and the martyrdom of the innocent. Remember the case of that poor fellow Dreyfus—a case that revolted the conscience of all humanity, while there was one man, Zola, who, in that famous letter of his, set forth a challenge involving the hatred of a nation, the fury of a military organization, and the anger of his own Government, an example of courage in a civilian that stands alone in the world.

' For me there will not arise another Zola, but there is a God, who judges the innocent and the martyrs, and so I repeat : " Put it to your conscience."

' My case is very simple and can be given in a few words : If I love the lady and desire to marry her, there will be no harm at all in giving me my liberty.

' Again, if I love the lady and she cannot marry me there will still be no harm, for I have not committed, and am not the man to commit, any bad action.

' Where, then, is the insanity ? A man is insane if he loves a woman who is already married and cannot return his passion. Again, he who desires to marry a Royal Princess, or any other woman with whom he never can be united, is insane ; but not the man who loves a virgin whom he can marry, for that is a natural love, and merits praise rather than punishment.

' Tell me, then, admitting it to be true that the lady whom I love is a millionaire, must I on that account give up the idea of matrimony ? Now I shall prove to you, if you are still incredulous, that had I wished to be a millionaire—that is to say, to marry for money and not for love—I might have been so long ago.

' Not to speak of the case of the English lady whom I have already mentioned, here are three others that will prove the truth of what I have said. Yesterday, in the course of conversation, one of my companions in confinement began to speak of two men who are proverbial for their wealth, Sc. and Ro. I do not know whether the latter has ever fallen in love with any of the numerous foreign ladies here in Naples, but as to Sc., I knew him in Naples, and from a great many signs I judged that he was many times a millionaire. I knew his daughters also, and can even inform you that one of them, the youngest, loved me, and often came to the villa on foot, so that it would have been an easy matter for me to make a declaration, but I refrained from doing so.

' In another instance a Marchioness, who was a millionaire fifteen or twenty times over, invited me to dinner, and I could not well refuse, as I was at her villa on official duty in connection with the delimitation of boundaries. As I was seated at the Marchioness's right hand, I might

have spoken to her about her daughter, who was perhaps in love with me, although it is not quite certain, but I did not say a single word.

'Here is the last instance. One fine day, as I was sitting in the villa, there came and sat alongside me a man who appeared from his looks to be a servant or a waiter. He sat so close that he quite touched me, although there was plenty of room. As he talked with another man who came up and stood in front of him, he said, speaking of a young lady, "That lady has a dowry of a million." I learned her name and might have seen her, and even to-day I might learn who she is, and whether she loves me, or whether I can make her love me. Still, I did nothing and said not a word.'

Several points become clear from this letter: his conviction that he can make any woman fall in love with him (defect of judgment, detachment from reality); the length of time for which he has had that conviction; the contrast between his consciousness, filled with erotic but platonic ideas and desires, and his defective sexual evolution; and the fact that he has never even had any fear as to possible persecution throughout the whole course of development of the erotic delirium.

Paranoia Quærule and Processomania (the Mania for Litigation).

As a matter of fact, these are not the same thing. Querulous persons are not all paranoic, nor have they all the same tendency to indulge in lawsuits. In large asylums patients are often met with who are continually complaining of something that never happened to them, and are always accusing someone. They are always in the same frame of mind—discontented with everything and everybody, unadaptable, prone to retaliate and to denounce. Such people are also met with in ordinary life. As often happens, they may be possessed of fortune greater than their intelligence would warrant, yet they are always complaining of their lot and regarding the good fortune of others with envy.

On the other hand, there are families—and their history could be better reconstructed in some provincial communities—who have ruined very considerable inherited estates by their love of litigating about the very slightest supposed infraction of some right of theirs, families who have nourished for several generations an indomitable hatred towards other families, their rivals in riches and in power, until they have squandered all their means in keeping the proceedings going. In those families one may always find a paranoic subject, an epileptic, an alcoholic, a reckless gambler and card-player, or an imbecile.

According to my experience, the litigious disposition is always a morbid characteristic that arises from a passional irritability of the ego, and from obsession with a basis of emotiveness, pride, and imperviousness to the current of opinion, whereby the error of their ways does not become plain to them. The first class belong to the group of the 'Querulirenten' of the Germans; the second are better classed under the name of litigious maniacs.

The mania for litigation depends upon an exaggerated sentiment of proprietorship, associated with a defective conception of the rights of property belonging to others. These two elements may be found separately, or, as is more frequently observed, in conjunction in the same individual, but in various proportions in different cases. The psychic figure of the querulous insane is substantially the same as that of the proud, persecuted paranoiac. So long as we are dealing with a passionai tendency to institute legal proceedings, due to the psychic conditions above mentioned, we shall speak of the mania for litigation. In many cases it is a paranoid state rather than real paranoia, into which latter it passes by degrees.

In querulous paranoia a frequent characteristic is a true delirium of persecution (*paranoia persecutoria quærulans*, the 'Quærulantenwahnsinn' or 'Quærulantenirrsinn' of the Germans).

In this case, not only does there exist an intellectual defect, preventing the perception of the limits of one's own rights, and, translating itself into a defect in the concrete conception of property, but there is also great affective excitability, not to speak of a permanent state of excitement, hurtful to the ego, and an exalted sentiment of one's own rights. Further than that, there is a true delirium of persecution, which follows a course of evolution similar to that of other deliria of the same class, constantly widening the sphere of its action, and comprising even the constituent bodies of the State, which, according to the litigious maniac, do not fulfil their duty, are subject to extraneous influences, and, instead of admitting his rights, which have been maliciously trampled upon, deal still more unjustly with his misfortune and his misery.

A legal process, generally concerned in the tangled arguments of these sufferers, though it may have a legitimate basis, is dragged from court to court, without any sense of propriety or of the importance of the circumstances. In their impatience to obtain justice these subjects call in new advocates from amongst those most in repute at the time, and should the latter refuse to take up the case, that is for them a further proof that they are being subjected to persecution. Should the suit not be carried to a favourable conclusion, through some fault of procedure, or if the verdict be adverse, or, again, if the case be abandoned by advocates who have taken it up under misapprehension, then the litigious maniac appeals to the great authorities of the State, to the Prefect, to the Procurator-General of the Court of Appeal, to the Keeper of the Seals, or even to the King. These persons usually give credence to the tales of injustice suffered, but can do nothing. After such efforts have proved useless, recourse is had to the press, in which sensational articles are inserted. Even those articles fail to alter matters, and the injured ones then create a disturbance or make some threat or other, with the sole object of calling the attention

of the authorities to their case. Finally, they are confined in asylums.

I have never seen a case of this sort with hallucinations (see, however, De Sanctis, *Rivista Sper. di Fren.*, 1898; Guicciardi, *ibid.*; and the invaluable monograph of Hitzig, *Ueber den Querulantenwahnsin*, Leipzig, 1895).

I give here a short history of a former inmate of this asylum.

OBSERVATION XXII.—P. Gaetano was admitted to the Provincial Asylum of Naples for the first time in 1883, and remained there only a few days. He came of healthy parents, and, so far as we have been able to ascertain, there had never been any case of neuropathy in his family. He attended an elementary school, and when he had completed his course, at a little more than fifteen years of age, his father placed him in a hatter's shop, which he conducted with varying fortune; ultimately, however, he succeeded in improving his financial position so as to be able to accumulate a capital of 40,000 or 50,000 lire. In 1859 he married. There were several children of this marriage, but of these only one girl survives. His wife died in 1866. He married again, and by his second wife he had other seven children, of whom five are alive. It was after the second marriage that his troubles commenced. A sister-in-law who did not succeed in drawing him into the net that she had spread in order to estrange him from his wife, threatened that she would alienate his wife from him, and would reduce him to beggary. Some time after, that woman managed to persuade his wife to go and live with her. All the rooms were cleared of furniture, and he was left alone in an empty house. This performance induced him to lodge his first complaint against his sister-in-law. No attention, however, was paid to that first complaint, because, he maintains, the Public Procurator was bribed. As he did not get the legitimate satisfaction that he expected, if his own assertions can be believed, he commenced to appeal to the King, then to the Keeper of the Seals. For that purpose he had twice to go to Rome, and meanwhile his business was going wrong. As a matter of fact, some one took advantage of his credulity; he, however, did not recognise the real cause of his ruin, but conceived a veritable delirium of persecution, and, instead of trying to restore the fortunes of the family by profitable industry, he began fresh lawsuits for supposed damage and injury to his rights, so that in a short time, though he was without the means of sustenance, he was involved in as many as fifteen lawsuits. As some of these lawsuits turned out badly and caused the loss of some of his property, his delirium of persecution was thereby fed to such a degree that, owing to his outbreaks, the loss of sleep, his refusal to eat, his violence, and the noise he made in the halls of the Palace of Justice or in the ante-chambers of the Questor's office, it became necessary to send him to the asylum. There he relates the story of his doings for hours at a time, telling of his pilgrimages, his anxieties, the injustice that he has suffered, and the way in which his rights were trampled upon. He tells, to the most minute detail, the way in which he presented his petition to the King, and what he said to the Ministers and other judicial authorities. He enters into particulars that have not the slightest connection with the proof he wishes to give of his rights.

He speaks for hours at a time, making accusations against the magistrates and political authorities and the doctors in the asylum, who do not give sufficient attention to his stories. He passes with extraordinary rapidity from the reasons for one lawsuit to those for another, stating the dates, persons, and localities with the aid of a sure and very faithful memory. Still, however much he may be questioned, he can never tell

what is the true crux of the matter, for that completely escapes him. The whole matter is reduced to a false conception of his rights and to a profound defect of appreciation of the limits of those rights—to an exalted self-esteem and to the false conception of an extensive system of persecution, *direct* on the part of those persons who are nearest him, and *indirect*, in so far as the judicial authorities and the other departments of State either have failed to defend him or have been bribed to join in bringing about his final ruin. The finishing touch of all this is found in the last extremity of the malice of his enemies and of the public authorities in sending him to the asylum—a proceeding against which he protests energetically, declaring that he is really of sound mind, and claiming his right to that liberty which will enable him better to protect his own interests and to continue judicial proceedings against all those aforesaid persons, and others, too, by whom he believes himself to have been injured in his rights.

We have never been able to detect any hallucination or even an illusion. Before he entered the asylum he had got to the end of all his means. For several months he came frequently to me to ask my protection and letters of recommendation to the political and judicial authorities, whom he had caused no end of annoyance. In the meanwhile, owing to lack of food and shelter, he had become thin, pale, and so reduced in strength that he could hardly stand on his legs, and, out of pity, I myself had finally to take steps to get him admitted into the asylum this last time. There he found comparative quiet, and his health became restored. Some periodicals took up his case at great length.

The *diagnosis* of paranoia is founded on the character that has been assigned to it at the beginning of this chapter. To arrive at a clear understanding of this group of psychopathies, it is advantageous to exclude from the class of paranoia all manifestations of apparently systematized delirium that represent episodes of other maladies which, in their course, the complexity of their phenomena, their result, but especially in their mode of onset, have a recognisable figure of their own, distinct from that of paranoia. This advantage is much greater still as regards the course and the result of the malady. For similar reasons of a strictly psychological and clinical nature, every confusional or acute hallucinatory form that leads to *amentia* or *dementia præcox* must be excluded from the field assigned to paranoia. So also must we exclude those systematized deliria that follow immediately upon a primary malady without any intervening period of mental sanity—well-defined acute psychopathies, and particularly melancholia and sensory deliria. Such consecutive systematized deliria form the large group of secondary paranoias, and are better considered along with secondary dementia, as they represent only the results of primary mental maladies. These forms sometimes end in recovery.

I do not include among the secondary paranoias that form which occurs some time subsequently to an acute sensory psychosis that has ended in recovery. In such cases there is developed at a late period, by a process of unconscious cerebration, a persecutory or a religious delirium of slow evolution, the roots of which must be

sought in the more active and predominant hallucinations of the primary affection from which the patient recovered.

Paranoia, as dealt with in this chapter, is always a chronic malady. It is to be considered as a whole, but more particularly in its origin and its course. It presents a physiognomy that cannot be confused with any other, if due account be taken of the clinical features already discussed.

Among the paranoias should be included those systematized deliria of content identical with the forms of paranoia just described, but of short duration, and succeeded by the normal state, except in cases of relapse. These are the paranoic deliria of degenerates. In such cases, in addition to the signs of psychic degeneration, there exist those also of the paranoic character. The rapidly evolved delirium is nothing else than an acute episode of relapse of the paranoic character.

Course.—As we have already said, paranoia runs an extremely long course. Sometimes the delirium remains circumscribed, just as it was originally conceived, but in other cases the whole personality becomes involved, after a longer or shorter period of time. I have still under observation paranoic subjects who were examined by me when the psychiatric clinique was first instituted in Naples some twenty-two years ago, and some of them still preserve fairly good logical power. Some paranoiacs show phenomena of mental decadence at a very early period—*e.g.*, the subject of Observation XIX., p. 596. Others, again, continue for many years in the same condition, the only difference being that the delirium is much more active and more clearly determined at the beginning, losing its vivacity as time goes on, and as the patients become better adapted to their environment, less threatening, less impulsive, and able to occupy themselves in some useful work.

States of mental decadence, characterized by authors as pseudo-dementia, are more or less marked, and make themselves evident at an earlier or later period, according to conditions peculiar to each individual. As a rule, it may be said that paranoiacs with hallucinations suffer mental decay much sooner than those without hallucinations. There may be a respite in the course of the paranoia, and sometimes there may even be an apparent recovery.

In such a case the patient realizes the falsity of his delirious ideas, and resumes his position in the social life; but, unless it be the neurasthenic form of paranoia, which I have placed in the second group, this respite is usually brief.

Generally speaking, the remissions, and sometimes the recoveries, belong to primary paranoia without hallucinations.

Episodes of hallucinatory mental confusion are not rare, especially at the beginning.

Death occurs, even at an advanced age, from intercurrent maladies.

We know nothing of the pathological anatomy of primary paranoia. The whole structure that Wernicke has built upon the concept of the interruption of the association paths, upon which he has formulated the doctrine of the disjunction of the psychic components (the disjunction hypothesis), is utterly without a basis of observation.

The *therapy* reduces itself to the methods of dealing with the separate phenomena—the great excitability, the more vivid hallucinations, the psychomotor exaltation, and the vasomotor phenomena. These must be treated on the general principles laid down elsewhere in this book.

The paranoiac is almost always dangerous to himself and to those about him, and the prompt intervention of the alienist frequently prevents incalculable damage. He is a subject in whose case confinement and supervision are urgently called for, more so than in almost any other; but, unfortunately, society cannot always protect itself against the injuries it suffers from paranoiacs.

CHAPTER IX

FIXED IDEAS AND OBSESSIONS

THE malady of fixed ideas, or in a larger sense of obsessions, is represented by a psychic fact with an asthenic and emotive basis, determined most frequently by some percept that cannot be assimilated, and that remains implanted in the consciousness as an extraneous element, without disaggregating or decomposing the personality ; or the percept may be recalled under identical conditions of existence, with its whole cortege of emotions, more or less in contrast or in combat with the consciousness, which usually succumbs after all its means of defence have been gradually exhausted. With regard to the nature of the obsessions, I could not give a clearer notion of them than by using an analogy which appears to me to give the most perfect idea of this very important group of psychopathies. I take it from ordinary physio-pathology, the facts and laws of which are too often neglected in the interpretation of psychic phenomena. It is now known that in psychic life we meet with the same laws as regulate and govern organic life. An organism lives, evolves, and adapts itself only in proportion as it has the power of prompt assimilation, disassimilation, and elimination, according to the known laws of biology. Proper assimilation means the appropriation of the organic and inorganic elements that are advantageous or indispensable to life ; good elimination means the getting rid of extraneous elements that have penetrated into the organism, or of the products of disassimilation that are hurtful, or of no service to the living being.

Wherever these conditions are not rigorously maintained, life becomes impossible, or else it is poor, abnormal, and curtailed. It is well known that there is a whole group of organic diseases in which this fundamental biological function is altered, and everyone knows the importance that this conception has recently acquired in the development and the progress of human pathology.

The processes of mental life follow similar courses. A well-organized mind must select and assimilate from amongst the numerous sensory factors those that will be serviceable for its development, and will associate with other psychic elements in

order to constitute the more complex and higher mental products, in which is summed up the concept of the evolution and progress of the individual, as a unit in harmony with his environment. It must also eliminate those psychic elements that cannot be utilized for the purposes of mental life. Through a power intrinsic to its own organism the mind eliminates all that will not serve the final end of man as an individual and as a social unit. Of the millions of stimuli and impressions that impinge upon the senses and the perceptive centres of man, reaching or crossing the threshold of consciousness, not one is lost, and if only a relatively small portion of them should become a patrimony that can be made use of, ready always to be vivified and re-evoked into consciousness, the remainder will be eliminated and lie buried at the bottom of the great ocean of 'the unconscious,' thence possibly to rise to the surface, in some tempestuous or abnormal perturbation of the mind. In minds that are badly organized (morbid heredity or other degenerative influences) it may happen that the process of psychic metabolism is interfered with, and that a psychic component, destined to pass transiently over the field of consciousness and to fall into 'the unconscious,' remains in the mind, and cannot be eliminated, just as it sometimes happens that some poisons developed in the organism, or some substances introduced from without, cannot be expelled, but remain and accumulate in the organism. These psychic elements that have not been eliminated are 'obsessions.' Once they have passed over the threshold of consciousness, they remain there as products that cannot be assimilated, extraneous to the processes of mental metabolism, which is interfered with, or even wholly prevented by them.

The psychic personality becomes painfully aware of their presence and their irrational recurrence. It feels the effects of the desolating action of these ruthless invaders; it recognises its own inferiority in face of these unbridled and uncontrolled elements; it reacts with greater or less force to free itself from them, but often without any other result than that of assisting them in their conquest.

At this point I think it advisable to trace the limits of the concept of fixed ideas and obsessions. Every idea that arises in the consciousness with the potentiality of development, and that has the virtue of directing the activity of a man's life, and guiding it towards some end, is not necessarily a fixed idea. An infinite number of ideas and percepts become the special psychic patrimony of each man, and there are others that dawn in the consciousness of one or several men, assume directive power, wind the resources of the intellect in ever-increasing coils, extend their sphere, caress the mind of the individual or illuminate the consciousness of a people, and, after they have been transmitted from generation to generation, incarnate the principle that animates a period of history.

These are not fixed ideas. They are, as it were, the regulative centre of a whole constellation, of a sidereal system, to adopt the expression of Ziehen. They are the offspring of the most varied social and historical conditions, and at the same time they become a fixed and luminous point, serving as a guide for a man or a whole society in the march across the steppes of time.

These are ideas of high nutritive power; they are assimilated to the personality, to which they impart their own colouring, and to which they communicate the movement that is intrinsic to their own nature.

All the ideas assimilated to and fused in the personality, immediate products of the percepts or more complex products, such as the concepts, should never be considered as fixed ideas. The existence of obsession demands certain indispensable conditions, and these reveal the morbid character of the soil on which this evil growth germinates. Those conditions are:

1. Excessive emotivity; for emotion, while arresting the movement of the ideas of defence in the consciousness, offers to external stimuli conditions suitable for the strongest impression, thus favouring the persistence of the emotion itself and of the relative images.

2. Congenital or acquired weakness of the mental organization. This co-operates in two ways. On the one hand, it favours the obsession through the paucity of ideas or emotions of defence, and, on the other hand, it renders less vivid and active those that have the power to drive out or to eliminate from the consciousness the useless parasitic products in which the concept of the obsession is contained. Before we can speak of fixed ideas and of obsessions, we must have the other essential condition that these be incapable of assimilation with the psychic personality at the historical moment; in other words, there must be a continual struggle between the ideas and the consciousness. The fixed ideas are importunate guests from whom the conscious personality would like to free itself, because they are irrational; but it does not succeed in this. Therein lies the essential difference between fixed ideas and paranoia, and for that reason I consider the classification of fixed ideas amongst the paranoias to be a cause of confusion, although such a course has been followed by Kirn, Krafft-Ebing, Arndt, Morselli, and Spitzka, the last of whom described the fixed idea under the name of 'abortive monomania,' corresponding to the rudimentary paranoia of Arndt and Morselli. In paranoia there is a transformation of the personality in the sense that the delirious idea is assimilated with the consciousness, and imprints on it all those characteristics belonging to it, as well as a course of conduct in social relations that is inherent in the nature and character of the delirium.

In the malady of fixed ideas, on the other hand, the personality does not undergo any transformation further than the afflicted tone

that arises from the tormenting despotism of ideas and emotions that are recognised to be irrational, and from the inefficacy of the struggle for freedom from these. This difference had already been observed and clearly defined by Morel, in terms that do not leave the reader in any doubt as to the clear conception of the acute French observer; also by Westphal, in 1877, and by Church. We shall see later on whether fixed ideas may become delirious ideas, and whether in that case only we may speak of paranoia.

For the moment let us restrict ourselves to the conception as understood by Morel, and let us try to trace its mechanism. The task here set before psychopathology is no easy one.

Most observers accord importance to emotivity and emotion. While Westphal and Krafft-Ebing consider the malady to be an ideative disturbance, without the coexistence of an emotional or passional state, and interpret the emotion as the effect of the more or less violent and painful reaction of the consciousness that is abused by the obsession, almost all the French authors, from Morel onwards, like Féré, Séglas, Ballet, Dallemagne, Pitres and Regis, consider the fixed ideas to have their origin in morbid emotivity. The two last-mentioned authors, who have written the most valuable monograph hitherto published, conclude that obsession is a highly emotional morbid state.

Not less numerous and authoritative are the German authors, who maintain the same idea. It is sufficient to cite amongst them Berger (emotional neurosis), Friedreich, Hans Kann, Schüle, Wille, Freud, and Hecker, the last two of whom give to the malady the name of 'neurosis of anguish.' Emotion does, in fact, constrain the ideative process to the image that it contains when it has perceptive or ideative content, and it concentrates the perceptive power and the attention almost exclusively on the image or the correlated idea, which therefore tends to assume dominion in the consciousness, and to bring about a condition of static emotion therein. We must not, however, neglect the fact, which has been well set forth in the publications of Tamburini and Magnan, that very often it is the idea that arises first, without any accompanying emotion, like a spasm or a state of tetanus in some part of the field of intellect; and the emotion that afterwards accompanies it is due really to the unusual vividness of the idea and to a species of shock that its uprisal gives to the consciousness. Later on it is to be ascribed to arrest of the interchange of ideas, and to the inefficacious struggle of the revolted consciousness in its endeavours to free itself from the abnormal product. While, therefore, we admit that emotion always accompanies a fixed idea to a certain extent, although the emotional state does not of itself constitute the painful static condition of the consciousness, we must acknowledge that there are cases in which the malady arises directly from the field of intellect, and is only subsequently accompanied

by emotion. At the same time, there are other cases, as observed by Pitres and Regis, in which the emotion becomes reduced in proportion as the malady is confirmed and assumes more of an intellectual character.

Some authors consider that this malady consists essentially in weakness of will (Magnan, Legrain, Ballet). No great expenditure of words is required to demonstrate the improbability of such a hypothesis. It is sufficient merely to remember that the ideative process and the association of the elements of the intellectual patrimony are regulated by laws to which the will is extraneous.

At the utmost the will has power only to concentrate the attention on a group of ideas, and to direct the process of thought towards an idea, around which are subsequently represented and developed, according to intrinsic norms, all the related intellectual material that each man has at his command.

But even this regulative and directive power that the will exercises over thought lasts for a comparatively short time. As soon as it becomes fatigued, extraneous thought invades the field, which has hitherto been closed, by voluntary attention, against all ideas not related to the special theme. Nowadays there is no psychologist who will argue that the process of thought is subject to the will.

On the other hand, if we bear in mind the very strenuous efforts to which those unfortunate persons afflicted by the malady in question will brace themselves repeatedly, in their desire to set themselves free from their tortures, we shall be convinced that it is not their wills that are defective, and that the will, which is vigorous though inefficacious, is subject to the inevitable law that governs the formative process of thought even in individuals whose mental organisms are weak in all other respects.

Nor does the doctrine maintained by Ribot appear to me to be more happy—namely, that the malady is nothing else than chronic hypertrophy of the attention. Ribot holds that, as in the normal individual attention has a temporary predominance over an intellectual state or successive states, so in the case of the fixed idea that predominance is absolute, lasting, and more intense. The sole truth appears to be that in the malady of obsessions a very limited group of cells performs its function; but anyone may convince himself that attention is only a secondary state of mind, and necessarily consecutive to the uprisal of a group of images and of emotional states that surprise and subjugate the consciousness. It is the law of intensity of stimuli that determines attention and the order of thoughts (see Part II.). The fixed idea that surprises the consciousness, especially when accompanied by an emotional state, attracts attention to itself, and the hypertrophy is therefore an effect and not a cause.

The formative process of thought, the intensity of ideas and of

groups of ideas, the succession of constellations or of ideative systems, the changes of states of consciousness along with the alternation of ideas and the corresponding emotions, the ever-changing directive power of the environment on the products of thought and on the states of mind, the instability of the kinaesthesia in weak organisms, regulating in its turn the course and nature of thoughts, are all decisively withdrawn from the regulative influence of the will and the attention. The sole essential law is the interchange of ideas and emotions in the consciousness, the selection that the mental organism makes, on its own account and by virtue of its own powers, from amongst the percepts and the complex mental products, and the rapid and immediate elimination of all those useless and unassimilable products that are not in conformity with the character of the personality, but rather in open contrast with its nature, habits, and inclinations.

Such elimination is spontaneous, and is not determined by will or by attention. Good ideas are those that contribute to life and to the increment of the psychic personality, and that exercise a veritable phagocytic power over the other useless parasitic and toxic ideas as soon as they cross the threshold of consciousness.

I say ideas, but the same thing applies to any form of psychic activity. Percepts, the various emotions, concepts, acts, and also desires, may furnish material for obsessions. As a rule the material of obsessions is supplied by the lower emotions, frivolous percepts, bitterly debated questions of metaphysics, or desires that are opposed by individual or social propriety. In all of them we may perceive an inferior character of mind, for there is no such thing as an obsession of elevated content.

From all we have said it becomes clear that there is no use in classifying separate forms of obsession in groups and giving them special names, although many psychiatrists seem to find great pleasure in doing so.

An indispensable and fundamental condition is congenital mental weakness (hereditary neurasthenia), or mental weakness acquired through abuse of the intellectual or other functions. Its differentiating characteristic is the more or less accentuated contrast in the consciousness subject to emotion; or, in other words, the helpless struggle against the inroads of the despotic and importunate guest (mental coercion).

I have said that all psychic products can form matter for obsessions. We elect to classify them in the following order:

Emotive obsessions.

Ideative obsessions.

Impulsive obsessions.

This distinction is not strictly psychological, because just as the emotions have an ideative content and a motor intuition, so ideas involve motor intuitions and emotions, and impulses always

nave an ideative and emotive content. The distinction is justified only by the prevalence of one of the constituent elements of each group.

Westphal did not place too high a value on emotive obsessions, which have been well defined by Morel and by Tamburini. H. Tuke, Tamburini, Van Eden, Regis, and Pitres agree with this classification.

Van Eden distinguishes :

1. Obsessive concepts, in which obsession starts from a precise and detailed concept that acquires impulsive force.

2. Obsessive emotions—fear and terror that dominate the will and the reason.

3. Obsessive ideas properly so called—the intellectual obsessions of the French, in which the sufferer cannot escape the obsession of thinking constantly of certain objects.

4. Obsessive impulses—the irresistible tendency to commit strange or improper acts.

Pitres and Regis distinguish :

1. States of obsession with diffuse anxiety, or panophobia.

2. States of obsession with systematized anxiety, or monophobia.

3. States of obsession with ideas of anxiety, or monoideism.

It is not clear whether this distinction leaves room for obsessive desires, which constitute a prominent class of obsessions.

Obsessive emotions are distinguished into repulsions or phobias and imperative desires. The phobias are either general (panophobia) or related to one particular thing. I agree with most authors that it is proper to place among the obsessions the so-called insanity of doubt ; but let us understand this point clearly. I have never seen a subject suffering from obsession who was not uncertain and hesitating in most of the acts of his life. All obsessed persons present this phenomenon to a greater or less extent. The doubt is a consequence of defect of judgment or of memory characteristic of a state of congenital or acquired weakness. It is an inevitable result of the inefficacy of the struggle between will and the new conqueror of the consciousness. Being a secondary phenomenon common to the whole group, it does not constitute a malady *per se*. The fear of everything that is unknown is a perennial source of doubt. From the unhappy person who is afraid of being defiled by or contracting infection from everything she touches, to the mother who is doubtful of her power to resist the impulse to scoop out her own daughter's eye, or to the man who is continually asking himself the why and wherefore of the Creation and of the Trinity, doubt is always revolving more or less actively in the consciousness of obsessed persons.

In some cases, however, doubt is an obsession *per se*. A man suspects that he has written something offensive or hurtful to his own interests or the interests of others in a letter that he has posted, and is driven to despair ; another man fears that he has compro-

mised himself politically by writing to a politician or to a magistrate ; another is driven to despair by the doubt that he has uttered words disrespectful to the Deity, or that he has rendered himself culpable in some other fashion ; still another is really tortured by the doubt that he did not shut the front-door properly before he went to bed, and to make sure of it he rises once ; but the doubt recurs, and makes him rise a second, a third, or even a fourth time. In these cases the torment comes from the doubt, which the subjects themselves recognise to be more or less irrational, but which, however, will persist. It is produced by a real defect of synthetic representative power, which is essentially sustained by a defect of the kinæsthesia. The subjects remember that they did not pronounce the offensive words, that they did not write anything that would compromise them, that they did not commit grave faults ; but they have no lucid representation of their own acts, whence their doubt of themselves and of the way in which they have acted. This is a very common phenomenon in neurasthenic conditions, and in many cases it is a really characteristic morbid state. It may have its origin in some very commonplace event, and sometimes it is based upon a dominant idea or sentiment (Freud). The field of its development is a profound alteration of the kinæsthesia. I here give a brief report of one of the most interesting cases from my private clinique :

A young woman of eighteen, notably sensual, in a very good social position, but with hereditary neuropathic taint, one day fell asleep in the garden surrounding her house. On awakening—possibly she had had a dream of a sexual character, or perhaps it was owing to some sensations in the vagina, a point that I could not ascertain with certainty—she conceived the idea that a lizard had penetrated into her vagina, and this caused her great anxiety. For two years she was tormented by that thought and the accompanying fear, even after she had been convinced that such a thing was impossible. She suffered real fits of anguish, with perspiration and dejection. Her condition was improved by suggestion, and matrimony proved a cure. I saw her some time afterwards, and her fear then was that she was not taking sufficient care of her new-born child.

From obsessive panophobia we distinguish melancholic panophobia, which is very frequent, and is accompanied by a state of permanent anxiety that is a form of melancholia. In the former class the anxiety is latent, and the fits of anguish and fear, which are known to be irrational, arise on every slight occasion. Cases have been reported by Morel, Freud, and Regis. This form of malady is not very frequent. Systematized obsessions, with fear and anxiety, are referable to the individual forms of common and special sensibility in so far as they have a perceptive or ideative content.

In the case of tactile sensibility the prototypes are rupophobia and mysophobia (the fear of dirt). The subjects of this form of phobia are for the most part young, of the female sex, and belonging to the well-to-do and educated classes. They are afraid of dirtying themselves or of contracting infection by touching any object whatsoever. They never shake hands ; they very seldom sit down ; they wash every time they are obliged, for some imperative reason, to touch an object, even should it be their own clothing, and they may thus pass hours and hours washing themselves. A certain distinguished young lady never went to breakfast before two or three o'clock p.m., and passed all the time from eight in the morning till then in dressing herself. It was with great difficulty that she could bring herself to take up her own clothes, and only after she had vanquished her repugnance to touch them ; but no sooner had she got them between her fingers than she felt herself compelled to wash, and immediately she was dry she began to wash again. It was impossible to prevent her washing herself, for she would break out into fury, thrust her hands into her hair, cry out, use imprecations against her mother, become red in the face, and perspire from anguish and fear, so that one had to let her do what she wanted. There were very few hours of peace. Sufferers of this class have a great repugnance to changing their linen and their clothes. They put on the same things over and over again, until they become filthy (contrast). In connection with the sense of space, agoraphobia, claustrophobia, and acrophobia are well known. In all these cases the perception of the relations of space is altered, giving rise to the idea of fear, of danger, or of destruction, and the anguish consequent thereon. The sufferer from agoraphobia is afraid of wide spaces or open squares in towns. As soon as he enters a square he is seized with extreme anguish, cold perspiration, and palpitation. In the most serious cases he is sometimes doubled up, and falls as though in a faint if he be not supported. Should he require to cross a square in the course of his business he would rather make his way round it, through lanes, or get someone to accompany him. He feels more confident when on the arm of a friend, and he faces the risk. A stick is also a relief to him. The same anguish is felt by those who are afraid of closed places (the claustrophobia of Verga) every time they are shut up in a room, a theatre, a church, or a railway carriage, as soon as the door is closed and the locomotive starts. In such a case it is not actually the fear of an extensive space or of a closed space. It is an idea of fear that has pre-existed and is reassociated under special conditions with the perception of space. A gentleman subject to agoraphobia began to suffer from it after one of his brothers had been seized by cerebral hæmorrhage in a city square. Every time he entered a large square there arose before his mind the terrifying idea that he too might be seized, and might die there, as had happened to his brother. A celebrated

railway engineer, a noted traveller, when setting out on a journey, was seized by unbearable fear and anguish whenever the train started, so much so that he frequently indulged the thought of opening the door and throwing himself out, although such an action would have cost him his life. This trouble commenced after a railway accident in which he had been.

All the perceptions furnish material for phobias : Metals (metallophobia), water (hydrophobia), glass (crystallophobia), velvet, red, blood, a dead body, poison (iophobia), needles (belenophobia), precipices (eremnophobia), rivers (potamophobia), lightning and storms (astraphobia), etc.

On one occasion a Neapolitan woman belonging to the lower classes (where the use of the knife is common) suffered a vivid impression on seeing a knife lying on the ground as she passed along a certain street, and from that day forward she had no longer any peace. The image of the knife could not be dismissed from her sight, and, as often happens, she was forced by the law of contrast to return frequently to the spot where she had first seen the knife, a prey to strong emotion. She ceased to care for her children, lost her good humour, and became irritable, melancholic, and always raving. She was aware of the irrationality of the fear and the uselessness of returning to the place where she had received the impression, but she could not control herself, for she was overmastered by a terrible feeling of anguish.

A boy of fourteen years old had an extraordinary fear of dolls. He belonged to a family with grave hereditary taint, and he had not got much beyond the limits of the most modest physiological intelligence. The sight of a doll inspired him with very great fear. When he was walking through the streets of the city he would leave his friends, who were on the pavement, and go along the middle of the street, lest he should pass near shops with dolls in the windows. I wished to be certain about this very strange phobia, and I invited my esteemed colleague, who had presented this patient to me, to go into the drawing-room in my house, where I had previously placed a big doll that belonged to one of my little girls on an arm-chair. I pretended, according to previous arrangement with my colleague, that I wished to show him a picture, and the boy followed heedlessly behind us. When he got near the chair he gave a cry, turned pale, and ran as fast as he could towards the balcony of the drawing-room, which we reached just in time to catch him and take him back to the consulting-room, where he remained a prey to the strongest emotion. If I were fond of giving names to phobias that have not yet been described, I might call this one 'pediophobia,' but it is not worth while.

Morbid fear of illness, or pathophobia, is very common. After the outbreak of cholera in 1884, it was frequent. Persons of serious character, usually belonging to good society, are continually tor-

mented by the emotional idea that an epidemic of cholera will come, and they look anxiously for some notice in the newspapers. They do not sleep, and in summer they go to places that they consider to be most immune from disease. These persons are really obsessed.

Sometimes such irrational fears occur only on certain occasions—for example, on seeing a certain article, or in certain particular positions. Phobias of this description are very common. They are not quite so morbid as the others, just because they leave the sufferer in peace so long as the particular occasion does not occur. A man once assisted at the slaughter of an ox, and the thought then occurred to him that he might be put in the place of the ox. From that time he has been unable to free himself from the intense fear caused by this recollection, and it becomes more acute every time he sees an ox or a slaughter-house, or when he hears either of those words pronounced.

History also furnishes us with some examples. Ladislaus, King of Poland, would run away in terror at the sight of apples. Henry III., who showed so much valour in many instances, could not control his emotion of fear at the sight of a cat. The Duke of Epernon had great fear of a young ape; and so on in many other cases. Sometimes these phobias have a professional character and resemble professional dyskinesia, as Berillon has acutely observed. I shall give some examples.

A young cleric, who could get through all the other duties of the priesthood, was seized with real anguish whenever he entered the pulpit (Berillon).

A druggist suffered absolute terror every time he made out a prescription containing poison, as he was afraid of poisoning his customers.

A theatrical artist, though he had had a very successful career, was forced to leave the boards owing to the anguish with which he was seized when he had to appear before the public. This phenomenon belongs also to timidity, and has been described by Hartenberg, and more recently by Francotte. Sometimes railway-engine drivers are seized with strong anxiety at the mere sight of steam-engines—the ‘siderodromophobia’ of Riegler.

A distinguished Parisian surgeon became a victim of insuperable anguish the moment a patient left his consulting-room with a prescription, from fear lest he should have prescribed poisonous doses (Regis and Pitres).

Desires, like the phobias, are forms of emotion, and writers have not all ascribed to them the importance that they merit. Desires represent the opposite pole to that of fear and repulsion. Phobia repels us from, but desire drives us, with more or less emotion, towards the object that provokes the particular state of mind. Both phobia and desire must pass through the same gradations,

from the subtle vibrations that begin about the limits of indifference to the most destructive commotion of the mind when we do not succeed in escaping from what is repellent or do not obtain what pleases us. In states of mental weakness due to heredity or neurasthenia these desires, which are irrational and almost always for trivial or hurtful things, reach their maximum degree, subjugating the mind uncontrollably and implacably, and forcing the victim to those acts that will satisfy the desire. Within certain limits the desires and actions are known to be irrational, improper, and hurtful to the patient himself. Let one example serve for all.

Some years ago I saw a lady who had come along with her husband, from a town in Sicily, for the express purpose of consulting me. She was a young married woman, belonging to a neuropathic family, and she presented unmistakable signs of anthropological degeneration and mental weakness. Previous to her marriage she suffered for several years from mysophobia, from which she had not completely recovered. A few days after her marriage an agreeable impression was made on her by a certain crackling sound produced by her husband, that sound making on her the impression of one of the sweetest of conjugal delights (perversion, degeneration). From that moment she was overmastered by the desire to hear the sound repeated, and she prayed and besought her husband to make the sweet music again. The poor husband was surprised, but managed to satisfy her once more. The mania increased, however; the lady became agitated, had cold sweats, and almost went into convulsions if her desire was not satisfied. The scene was repeated every night when they went to bed, and the unhappy husband had to prepare himself as well as he could to satisfy her twice, or at most three times. She, however, insisted on the music being ten times repeated, which was quite impossible, and so there were the usual outbreaks of mania. The unfortunate woman told me this story in tears, and besought me in charity to free her from this strange desire, because on the one hand she felt herself humiliated by it, and on the other she suffered unbearable anguish when she was not satisfied.

As will be observed, desires may be of the most diverse and extraordinary character, and there is no need to trouble ourselves about the names to be given to manifestations of this sort. There is, however, one category of cases that has been very thoroughly studied, though not classed by all authorities amongst obsessions. These cases comprise certain degenerates, congenitally neuropathic, or who have become neuropathic through the circumstances of their lives, who exhibit an invincible desire for alcoholic substances or drugs, after they have once derived some advantage, or even some transient relief, from their use. Here I refer to dipsomania, cocaineomania, morphinomania, chloralomania, zincomania, antipirininomania, and all the other manias now met with, or that will be met with in future,

as pharmacology advances. Individuals affected by these are for the most part weak ; they feel worn out, and in addition to their asthenia they suffer from a real malady of the kinæsthetic sense, which manifests itself in undefined suffering, localized in most cases in the stomach (cardialgia), or in the head (cephalgia). As they cannot tolerate trouble or pain, they have recourse to some calmative or hypnotic, which to begin with is generally prescribed by their medical attendant.

When the remedy, as frequently happens, gives them relief or a certain degree of well-being and vigour, it becomes their inseparable friend, the comforter of their existence, a deity to whom incense is offered by the enslaved mind. They cannot give up the drug ; they carry it with them when travelling or when out walking ; it takes the first place among the ' necessities ' of their existence ; they cannot live without it. The desire cannot be overcome by any reasoning, by any exhortation, or by any effort of will.

From time to time the dipsomaniac is seized by a certain feeling of discomfort, which soon becomes associated with the idea of drinking wine or liqueur, for the reason that, on a former occasion, a small quantity of wine or liqueur was useful in restoring him or giving him a feeling of comfort. The subject is often the son of an alcoholicist, and, as happens to all weak and psychopathic persons, the psychic product of an association becomes fixed. The discomfort increases with the desire to drink, and the subject struggles as best he can against this obsession ; but he soon yields, and drinks his first glass of wine, or, if it is in the morning, his first glass of liqueur. From that moment the mania for drinking becomes all-powerful, the thirst ardent, and the obsession imperative. He buys bottles of liquors, or goes round the shops sipping them. The more the conscience is obscured the more the power of resistance is diminished. He no longer eats—he simply drinks. He suffers from burning thirst, fire in the head, and staggering ; he vomits, and drinks again. Finally, he falls into a comatose state, and is picked up on the roadside ; or, having profited by experience, he gets into this condition shut up in his house, where he has previously laid in a store. When he comes to himself he is weak and worn out, confused and melancholy. He has headache and is sleepy. Slowly he returns to his normal condition, and then he either loathes wine and liqueur for a certain time or uses them in moderation until he has another outburst. The same thing happens to the morphinists, *mutatis mutandis*.

The punctures of Pravaz's syringes, the little abscesses and the sores that these sometimes produce, the offences to the æsthetic sense that young women sometimes commit by disfiguring the fair skin of the abdomen and the thighs with cicatricial dark nodules, are mere trifles for them, as are also their paleness and loss of flesh. Everything is sacrificed to their god—morphine, cocaine, or opium.

All these subjects are aware of the harm that they are doing themselves, and of the injury to their health. They would like to emancipate themselves from the tyranny of this strange master, but the desire is much more powerful than their wills, and so the struggle is useless. Morphinists, chloralists, and cocainists are all the same : they are obsessed, like the victims of phobias and the dipsomaniacs ; the only difference is in the content of the emotion that obsesses them.

We come now to describe another group of obsessions—the obsessive impulses.

There are ideas which have a motor content, which present themselves before the consciousness, and, either directly or through the law of contrast, exert irresistible power of translating themselves into action. These are the so-called impulsive ideas ; they are the reflex of identical percepts, or they arise through contrast. Once they have reached the field of consciousness these percepts fix themselves there, in open contrast with the sentiments and the tendencies of the subject.

A lady heard a tale of a woman who, in a fit of anger, resulting from a quarrel, had put out another woman's eye. She had along with her her only daughter, a little girl of seven years old, whom she loved excessively, and under the emotion of the terrible story she thought, 'If I were to scoop out one of my daughter's eyes!' A shudder passed through her, she shook with horror, seized the child's head in her convulsive hands, and kissed it over and over again, almost weeping ; but suddenly she pushed her far away, for the image of the deed, the motor intuition, the imperative tendency to realize it against every effort of her will, fixed themselves like thorns in her mind. She became melancholic, lost her appetite, consulted doctors, and was driven to despair by the tyranny of the frightful obsession. She became afraid of all sharp instruments, especially of scissors, with which she could most easily have obeyed the obsession. It was necessary to have the daughter taken away from her, as the mother could not be removed for family reasons. She recovered after six months.

At other times ideas arise spontaneously, as if through the victory of feelings or ideas of contrast.

Here is an example :

A cultured, intelligent, but hysterical lady, without children of her own, had living with her an infant daughter of one of her sisters, and she loved the child tenderly. One day she was looking over the balcony of a room on the third floor, holding the baby in her arms and caressing it. Suddenly a grotesque and insidious thought flashed through her mind : 'If I were to throw it down!' She went back again into the room, a prey to the strongest emotion. She clasped the child firmly in her arms, wept, trembled, and was in despair that she should ever have thought of such an action so

entirely opposed to the lively and sincere affection that she had for her little guest. From that day on, however, the impulsive thought was rooted in her consciousness, seated there as on a throne, tormenting her, scourging her, and dominating her mind. The lady became sleepless, pale, and irritable. She ceased to look after her household. Several times she came to consult me, a prey to the most extreme anguish. She recovered about a year later, after the child had been removed, and she herself had been sent away to quite different surroundings.

In this same class we must enumerate the obsessions of suicide and of homicide.

We know the psychological mechanism of suicide in melancholia and in the various insanities—epilepsy, paranoia, neurasthenia, etc. Obsession is quite another matter. The idea of suicide arises and surrounds itself with a cortège of motor intuitions that press upon the consciousness, which defends itself but weakly. In these cases melancholia is consecutive to, and dependent upon, the keenness of the struggle, the fear of succumbing, and the imminent danger that the impulse will be translated into action (Wille, Legrand de Saulle).

The obsession of homicide has the same characteristics. One example will suffice. One day there came to my private consulting-room a tall, pale, thin man, with black and catlike eyes, and aquiline nose. Altogether he presented a somewhat savage and grotesque figure. When asked to sit down and tell me the story of his sufferings, he placed himself very close to me, and said, 'Professor I shall be brief. For three years past I have had no peace. A terrible thought, from which I have been quite unable to free myself, is crucifying my spirit and terrifying me; it is a fixed idea of wounding, of killing somebody, that gives me much pleasure, yet causes me great terror. I cannot sleep, I cannot eat, I cannot work; I have no interest in anything, and I hate my life. I struggle in vain, and I am afraid that, in a weak moment, I shall compromise myself and the honour of my family.' As he spoke these words he was constantly becoming more excited, whilst almost a shudder ran through his body; his eyes flashed, and he came closer and closer to me, so that I had very cautiously to assume a position of defence.

In this subgroup are comprised *obsessive* pyromania and kleptomania. In obsessions of this sort we have neither imbecility, nor the unconsciousness of the epileptic, nor the deliberate design of a delinquent; there is only the imperative obsession that constantly forces the subject to do a deed that is in the highest degree repugnant to him. A surgeon-captain in the navy, neuropathic and a misanthrope, in whose case I had to express an opinion in the course of judicial proceedings, was obsessed by the notion of stealing sugar and coffee from one of his messmates whenever he had the

opportunity, although theft was repugnant to him, and although he knew he could not make use of what he had stolen, for he was in easy circumstances, and hardly ever took coffee. It was an imperative impulse that he could not resist.

When obsessive impulses are harmless they are rapidly put into action, and we find hardly any trace of a struggle, except the anguish that arises from the extrinsic difficulties met with in performing the act.

One has the obsession of counting all the windows in a palace as he passes along the street (an obsession from which Napoleon I. appears to have suffered). Another counts all the lamps in the street every time he passes along it, and if he makes a mistake he falls into a state of anguish, turns back, and counts them over again. Another is forced to count the books arranged in a library; still another will count the letters in one or several words, or will make interminable calculations (arithmomania). Another person is forced to make calculations always with odd numbers. A man writing a book labours to fix the number of the pages. One of my patients felt himself forced to measure the length and breadth of the Piazza Dante every time he passed through it, and after doing this he was tormented by a doubt that he had not measured it correctly, and that the number of paces that he had found was not the exact number. Others yield to the obsession to pronounce certain words, most frequently obscene or ridiculous, even when they are talking face to face with another person.

To this obsession, which often becomes automatic, the name of coprolalia has been given. In course of time it becomes a tic.

The more frivolous obsessions, those which do not come into conflict with the moral sentiments, become automatic acts, and then the obsession ceases. To this category belong musical obsessions (*De Sanctis*). There are individuals who, once they have heard a passage of music or a melody, hear it repeated in their ears an endless number of times. This music becomes an actual torment, and sometimes the subjects are obliged to sing the air over and over again. Nothing will enable them to forget it or to restrain their impulse to sing.

Sometimes the motor impulse is discharged from the automatic centres, for which the inhibiting power of the superior centres is insufficient. Such a case we have in the tendency to laugh in presence of every person. A young employé, highly educated and intelligent, was tempted to laugh, and did laugh, every time he met anyone he knew. At first the phenomenon was restricted to his relations with his office companions, but afterwards its range was extended. Several times he ran the risk of compromising himself. He deplored the fact, fell into a state of anguish, and was afraid of meeting people in case he should laugh in their faces.

Motor impulse is also characteristic of the *ereutophobia* described

by Regis and Pitres, and termed the 'obsession of blushing' by Soury. The following is a summary of the important article published by those authors in the *Archives de Neurologie*, 1897. A neuropathic youth blushes under given circumstances, and a painful impression follows. From that moment, under the same circumstances and in the presence of persons, the emotive blushing is reproduced, with moral pain, and the subject is preoccupied with it. Up to this point the phenomenon has been intermittent and occasional, but gradually the thought of this infirmity invades the mind, dominates it, makes it restless, and, to make matters worse, all recollection of, or preoccupation with, blushing causes further blushing, so that the poor patient is continually dominated by this emotional phenomenon. 'The phobia becomes an obsession,' in which the motor impulse is discharged along the vaso-dilator nerves. No obsession is so humiliating or causes so much fear as this one. No victim of obsession is more given to the idea of suicide than the ereutophobiac. Such persons feel the heat in the face, and are conscious of their blushing, so that they have no tranquillity even in the midst of their families, at their employments, or on the streets. It seems to them that their blushing is a constant accusation of something that they have done. Some of them shut themselves up at home, and do not leave the house except at night, for night gives them the tranquillity that dawn deprives them of.

Of the same nature is the fear of requiring to evacuate the bowels when away from the house, and particularly when visiting other people, or in the theatre or the church. The fear that such a thing will occur produces the dreaded result; the intestines are set in motion on all occasions of the sort, and the discharge of the bowels, present from the first as a kinæsthetic image, is irresistibly produced. The recollection of this fact and the fear of its repetition are continually represented, until they assume the character of an obsession.

This might be termed 'coprophobia.' I have observed it only twice, in the persons of adult women.

There are other obsessions which do not exceed the limits of sanity. Among these I might mention onomatomania, which is comparatively frequent (Charcot and Magnan). This is the painful search for a name or a word, with or without an irresistible impulse to repeat it when found. On most occasions the anguish is due to the fear of not finding it, and might be called 'amnesiphobia.' It occurs also to sane persons that they cannot recall, with the requisite promptitude, some particular name or other, which, however, recurs to the mind some time afterwards, either spontaneously (unconscious cerebration) or as the result of reflective concentration of the will. In such a case the consciousness is usually slightly troubled until the name or the word is remembered. In cases of obsession, however, the anguish is intense, and the mind is concen-

trated upon the word that will not come up. Even when it has been evoked, the fear of not being able to remember it or some other word, continues, and the subject passes many hours of the day in evoking the words, being troubled by the thought that he will be unable to summon them when necessary. This occurs more rarely in the recollection of passages of prose or pieces of poetry.

One of my patients had, among other obsessions, that of testing his memory by repeating a canto of Dante or a poem of Leopardi, and this caused him days of anguish.

Sometimes questions of philosophy plant themselves in the consciousness as a perennial interrogation. 'How was the world created?' 'Does a God exist?' 'If so, how and by whom was He created?'

These questions are like an oyster fixed on a rock emerging from the sea, and opening its valves every now and again for nutriment. Though so many waves, both gentle and raging, dash around it, they cannot detach it.

A learned philosopher, the story of whose malady has been referred to by Regis and Pitres, wrote the following, among other matters, to the author of the report: 'To read in the newspapers that Kaiser William or the President of the Republic had to smile 500 or 1,000 times during a reception sometimes causes me real anguish. I could far more easily perform the labours of Hercules than do that.' Meanwhile this thought had become a true obsession, so that he ultimately wrote that he was resigned to carry his malady to the grave.

In one group of cases, not at all rare, the obsessive ideas are of æsthetic and hypochondriacal content. A young lady who had the good fortune to have a rich and beautiful head of blonde hair conceived the idea, in consequence of strange sensations in the scalp, that her hair had fallen out, and that the portion that remained had become stiff as bristles. This notion, of which she made every effort to rid herself, was the constant affliction of her whole youth. She would weep and fall into despair, eat very little, and often stay indoors for weeks at a time. I saw her after she had suffered from the malady for several years, and sometimes she would ask me if it was not true that her hair had been changed to bristles (rudimentary paranoia). Another very beautiful lady, whose cherry lips were surmounted by a fine down that looked almost like a voluptuous veil over the upper lip, had been tormented for years by the obsession that that down, which was nothing more than what every brunette has, would grow like a moustache. She passed the greater part of the day before her mirror. She was constantly asking the inmates of her house as to the condition of the hair on her upper lip, while long fits of anguish alternated with short periods of calm. She obliged her husband to bring her from a distant province to consult me. Two years later she recovered.

From this brief outline it will be inferred that the phobias and obsessions are almost always the product of percepts that impinge upon a morbid emotive basis.

The importance of emotions produced by percepts, as the element determining the obsession, is proved by a great number of observations, from which I select the following one :

As a man of forty-three years was returning home from a place at some considerable distance night overtook him, and he lost his way. He wandered about the country, a prey to vivid and strong emotions, and almost went crazy with fear, so much so that he did not hear the voices of those who were calling him by name. From that day he had an absolute fear of the country, and an invincible and irrational desire for his own house. Whenever he went the slightest distance from home he was overcome by strong agitation, felt as though some obstacle might prevent him from returning, and was seized by an irresistible desire to reach home again. If he were prevented he suffered from anguish, cold sweats, and accessions of fear. He recognised the irrationality of these, and tried to free himself from them, but in vain.

Breuer, Freud, and Janet, especially the last, describe the so-called 'subconscious fixed ideas.' These ideas, which may have serious consequences, are represented and maintained only during hysterical attacks, dreams, and somnambulism. In the normal state they remain outside the consciousness. I have said ideas, but they may be judgments, fears, or impulses. One of Janet's hysterical subjects used to repeat during every accession, 'My husband, my poor children, that poor Jeanne, who——' Occasionally we get hallucinations which are repeated, and are the reflection of a terrifying event that had occurred some time before.

I shall not dwell too long on these phenomena, which have so many analogues in normal life, as well as in other pathological states, and which, in my opinion, would be wrongly placed among the fixed ideas. Having determined the limits of fixed ideas, and that in no artificial way, and having admitted contrast and emotive states of the consciousness to be the characteristic features, I find insuperable difficulties in agreeing with Janet's views, which would lead to confusion in the recognition of the clinical figure of the malady of fixed ideas. These represent a malady of the consciousness, while the others are a malady of 'the unconscious,' which opens a vast field to research and to hypothesis. At the utmost these subconscious fixed ideas form a zone intermediate between true obsessions and hysteria.

To return to obsessions after this slight digression, I shall touch slightly upon some other particular points. Among these the character of certain phobias must be noted. Morselli has well distinguished fixed ideas into the egoistic and the altruistic. I cite only a few examples.

A good girl is afraid of pronouncing or having pronounced words that are disrespectful to persons whom she knows, loves, and esteems. A boy of nine or ten years of age is careful not to pass near a table on which are books or near a bookshelf, owing to a fear, which he clearly sees to be irrational and morbid, that the books will fall upon him, although the table is quite firm or the bookshelf properly balanced. His fear is much more intense when another person approaches a bookshelf or a table on which books are lying.

A youth is afraid of touching anything, of making himself dirty, or of contracting infection, not on his own account, but lest he should dirty or infect other people. He never gives his hand, not because he is afraid of soiling himself, but because he does not wish to soil or to cause injury to others.

Fixed ideas are very rarely accompanied by hallucinations. This fact was denied by Morel, but J. Falret insisted upon it at the International Congress held in 1889. In the main it must be considered true, if we remember that psychiatrists of long and extensive practice have never observed cases of fixed ideas associated with hallucinations. Cases are reported, however, which, if they form an exception, prevent the absence of sensory disorders from being regarded as a law. Tamburini, Stefani, Séglas, Catsaras, Mirto, Féré, Wernicke, Pitres, and Regis have observed and published some cases of this sort. One of my patients is affected with grave mysophobia relating to milk and butter : every now and again he looks at the tips of his fingers, even in my presence, and notwithstanding the strong suggestions that he gets from me, and imagines he finds there white marks of milk or butter ; he is then seized with strong emotion, and runs away to wash. Often while he is speaking he will suddenly bend down towards the floor, and point with his finger to a white spot, calling anxiously for his servant to come and wash away the white speck that does not exist. When he is alone he will pass hour after hour stooping to the floor to look for white or yellow spots, which he sometimes finds (hallucinations). He then runs to wash, and returns eagerly to the search, crying out and becoming frantic in his dread that similar substances may be found in his own room.

In this case the hallucinations are simply the peripheral projections of the phobic content, or of what is closely connected with it. The white or the yellow is representative of milk or butter in the case of my patient, and there is corresponding representation in the erected penis seen by the lady who had a horror of sperm. This last case is mentioned by Féré.

It is not difficult to believe that the terrible doubt that torments those who fear that they have spoken words offensive to the Deity depends upon subconscious verbal hallucinations—the obsessive hallucinations of the French.

Visual hallucinations are much more frequent in morphinomaniacs. Their presence generally denotes greater severity of the malady.

I have mentioned the reasons for which I hold that we must not confuse the fixed idea with systematized delirium, and the essential differences between the two. I accordingly think that the title of paranoia is very unsuitable as a denomination for the former condition, for it includes the idea of substantial transformation of the personality. There is, of course, the possibility that the fixed idea will become a delirious idea, and the nucleus of a system of phobias with false judgments. In such a case the patient believes in the rationality of the fear and ceases his resistance, so that a subdelirious system is organized. Although the pathological concept of the fixed idea or of the obsession is founded on the contrast in consciousness, I must still admit that Meynert, Kraepelin, Morselli, Krafft-Ebing, and even Schüle himself, were not wrong in ascribing importance to the paranoic character of the fixed ideas, because, as a matter of fact, in many cases during the obsessive attack the patient fails entirely to recognise the irrationality of his fear, and therefore of his behaviour. It is during the intervals of respite that he sees with profound sadness that he has been the victim of obsessions which he recognises to be irrational; in some cases, again, the obsessive idea at length assumes the character of delirium.

I give here a general outline of a case which is very interesting in this respect.

A young man of high social standing, but gravely affected with hereditary taint, began to be subject to obsessions when he was twenty years old. He experienced a strong feeling of repugnance and horror on finding a spot of oil on some papers which he had to consult, and which were lying on a table. Thenceforth he had a real horror of grease, and he avoided touching anything at all, as far as was possible, for fear he should be spotted with grease. He had the soiled papers expressly shut up in a room, for fear lest others might touch them and involuntarily carry grease to other papers or books, for in his view that would have been a serious misfortune. Some years later his irrational fear extended to butter, from analogy with the oil that had produced the original spots. From butter the obsession extended to milk, and soon afterwards also to the animals that give milk—the goat and the cow.

He suffered extreme anguish whenever cows or goats passed by his house. If he saw a cow pass along any road, he would not go along that road for months afterwards. He would also shut himself up in his house to avoid stepping on ground over which he knew that a goat had trodden. From the outset he was perfectly aware that his emotions were irrational, and he discussed his anguish with me at great length. Still, he was so subject to them that nothing

would restore his calm and give him the freedom to go about his business that he felt he urgently required. From fear of soiling himself with grease he has for years past written nothing else than telegrams, on which he spends a very large sum annually, and for some time back he has not even written these, but dictates them. He is now over fifty-six years of age. I saw him for the first time in 1888, then I lost sight of him, but saw him again in 1892, since when I have visited him rather frequently. The circle of obsessions has widened and extended. Many white articles, and especially slaked lime, which so much resembles milk, cause him great torment.

The phobia, or the obsession with fear, amounting to anguish, has gone so far that he will thrust his hands into his hair and emit painful or furious cries when words resembling 'burro' (butter), such as 'pure' (also), or 'muro' (wall), are pronounced in conversation (obsession progressing through alliteration).

The important fact that has induced me to enter into these details is that, although the subject has been aware of the irrationality of his obsessions for many years, has consulted medical men about them, and has also fought against them with all the resources of his intelligence, which is by no means ordinary, and notwithstanding all his wide culture, and all the education he has received in surroundings of a high order, his struggle has become gradually weaker and weaker of late years.

He now actually believes that milk and grease can penetrate a great distance, and cause great damage to papers, books, and persons. He will maintain his thesis for hours, debating the question with an inexhaustible wealth of strange arguments that his mind has always ready. He is convinced that milk can soil him even from a distance of 33 feet. In this case it is not only the fear of milk that tortures him, but the *conviction* that milk at a distance has actually soiled him. It is not now simply a question of fears, the irrationality of which he recognises, but of false judgments and absurd conclusions, in defiance of all physical laws, which laws he considers of no value, just as paranoiacs do. What has happened to this patient is what occurs in the case of races who have been subjugated by a conqueror, against whom they have conspired for many years, displaying for a long time a hostile attitude, and bearing his yoke always in a spirit of rebellion. After a long period of more or less tyrannical government, when they have been disarmed, reduced to misery, and their life-blood exhausted, they lay aside their enmity, conform to the will and the laws of their master, are penetrated by his spirit, character, and tendencies, and become one with his own people.

After thirty years the fixed idea has monopolized the consciousness of this most unhappy man, and has become a rudimentary paranoia, notwithstanding his long resistance. I agree with Morselli

in giving the name of *obsessive rudimentary paranoia* to this form or to these phases of obsession.

A profound study has now been made of many forms of inversion or perversion of the sexual instinct, but none of these belong to the category of fixed ideas.

Ætiology.—In one group of cases the ætiological factor is grave psychopathic heredity while in another group it is the same as in neurasthenia.

Prognosis.—We distinguish two categories of cases—those of developmental psychasthenia due to grave cerebral maladies of infancy or to heredity, in which cases the disease appears very early, sometimes in the beginning of childhood, and the cases of acquired neurasthenia resulting from unfavourable circumstances of life. In the first the prognosis is grave, because recovery is rare, and occurs only in exceptional cases, influenced by very favourable conditions of education and upbringing. In these few cases the energies, weapons of defence of the mind, are latent, but if well disciplined and well directed, may finally get the better of the invaders, who are always ready to resume their dominion. In the greater number of cases, however, the obsessions gain ground, and we have not one only, but five, ten, or a great number of obsessions succeeding one another or coexisting.

The law of association and the panophobic condition assist the gradual extension of the dominion of obsessions. Fear terrorizes and rules; perception assumes always the same character; the power of judgment becomes more confused, and its means of defence are continually impoverished. The personality is very little, if at all, disaggregated, and can almost always be recognised for a long period as being abandoned to its destiny, tired of reacting.

It is rarely that the malady of obsessions is transformed into other forms of psychopathy. Pitres and Regis report five cases that they observed, and in these they note the passage of the obsession into anxious melancholia with ideas of delirium or hallucinations. I believe that when Falret, Magnan, and Legrain affirmed decisively that there is never observed even the slightest modification of the syndrome of obsessions, they did not take note of melancholia with anxiety, which I consider to be by no means rare. The slow passage to rudimentary paranoia also obliges me to range myself with Meynert, Schäfer, Wille, Kraepelin, Wernicke, Morselli, Mickle, and Séglas, who have observed transformation of the syndrome into systematized hypochondriacal delirium. The example already quoted by me goes to prove this transformation, which is quite independent of the epileptic character of some forms, as noted by Mickle.

Sometimes there are complications with other maladies, as I found in the case of a young woman affected by syringomyelia.

Suicide also is rare. The subjects of obsession are undecided, always tormented by the doubt whether they should or should not do anything, and frequently they think of suicide, but cannot make up their minds to it. When the obsession, ideative or motor, has lasted for a long time, and the reaction in consciousness has been weakened, suicide becomes less probable.

The course is different when the obsessions occur in individuals who are well constituted and of good cerebral development, but who have become neurasthenic owing to unfavourable conditions of life. Such patients have a richer fund of resources, and their consciousness more easily recovers its eliminating power. In the struggle against the invader or the parasite there is a greater possibility of victory for the neurasthenic subject who has been originally of good mental constitution. Among those whose history I have been able to follow, and whom I have treated directly, I reckon a reassuring proportion of recoveries.

Therapy.—There are children with hereditary taint who very early show a tendency to fixed ideas, being preoccupied for a long time with some impression that they have received, frequently asking the same question over and over again, and in given circumstances showing the same exaggerated fear. They are always highly emotional. The first duty of the medical man is to see that such children receive the most assiduous care, the condition of their organism being improved and the kinæsthesia strengthened by muscular exercises, while the mind is reinvigorated by well-selected mental exercises, proportioned to the power and nature of the child's intellect. In developmental psychasthenic subjects with a tendency to obsession the utmost that can be done is reduced to the above. In these subjects, when the malady is well developed, and maturity has been reached, our therapeutic resources will in most cases be exhausted by time and by the tenacity of the obsession. There are soils that always produce a great many parasitic plants, from which the industry of the cultivators cannot clear them. As a rule, these tracts are those that reward the labourer least. The same thing happens in the mind of the subjects alluded to. Cultivate them as you will, the result will always be a small product of inferior quality; a number of useless parasitic germs exhaust the soil, destroying with their branches and roots the few good plants, which grow phthisical and sickly. Obsessions change, are transformed, give periods of respite, and spring up again, according to the circumstances of the patient's life. It is very rarely we manage to eliminate them altogether. Intelligent prophylaxis, well studied and applied in time, will secure the reinvigoration of many weak mental organisms, and will restore the conditions that render possible the elimination of all useless and parasitic products from the field of consciousness.

For obsessions that have developed in individuals of good mental constitution, but who have become neurasthenic, and for the obsessions of hysterical subjects, the treatment is the same as in neurasthenia, of which we shall speak in the next chapter. It can be summed up in a few words : relieve the neurasthenic from the action of all exhausting influences, raise the tone of the kinæsthesia by well-graduated and selected muscular exercises, elevate the mental tone, and inspire him with confidence born of the authority of the medical man, and the sureness of his judgment. Electricity, fresh air, and water, are the other great resources of the physician ; all the rest are rubbish.

It is very rarely that we meet with conditions that demand the confinement of such sufferers in asylums, and even when seclusion is advisable, it is rarely that it is of any use. The discussion raised by Westphal, who emphasized the injury done by confinement, has been continued down to the time of Rouillard and Iscovesco, who consider confinement necessary. It reduces itself to a simple question of opportunity and selection.

No doubt the impulsive forms and those of delirious or hallucinatory content sometimes require confinement, but here the opinion of the medical man must be decisive and responsible in each case. The physician should take into account not only the nature of the obsession, but also the character of the patient, the circumstances and the surroundings in which he is obliged to pass his life. Sometimes the patients themselves ask to be sent to an asylum, but in most cases this should neither be advised for them nor imposed upon them.

A great deal has been said and written about treatment by suggestion, either when the patient is awake, or when under the influence of common hypnotism. It would be well for us not to form any illusions on this point. Certain clinicians who obtained some measure of success lost no time in publishing their results, and these opened many avenues to hope ; but when we compare the rarity of published cases of cure by these means with the frequency of the malady of obsession, we are forced to attribute to suggestion only a very modest value. I have already spoken of the ' intelligent authority ' that the medical man should exercise over patients of this kind, and it is in that phrase that we find the essence of the idea of suggestion when the patient is awake. The real office of suggestion is to supplement with words of authority that deficiency of mental energy in the neurasthenic subject which prevents him from eliminating the useless products that form the basis of the obsession ; to put new objectives before him ; to provoke new emotions ; to study and get to know the nature of the patient and his tendencies, in order to cultivate seeds that have not germinated ; and, above all, to reinforce the kinæsthesia, which gives more tone to the normal content of the mind, and

which, through its own intrinsic energy, will eliminate useless products.

I do not know whether, as Janet says, it is really in our power to reconstitute a personality that has been disaggregated, or to disaggregate a personality that has embodied in it new obsessions, but which, we must admit, preserves its former identity, except that all the mental components are inhibited, so that they lose energy, and therefore the power to direct and to eliminate the content of the obsessions.

The hopes conceived of hypnotism as a means of treatment of obsessions are fading every day, for every clinician who has any extensive professional experience must be convinced of the uselessness of all efforts to hypnotize persons with obsessions. As a rule, these latter resist the efforts of the best and most capable hypnotists, unless they are morphinists or such-like. The worst of the matter is that the sufferers themselves believe in hypnotism, and of themselves will ask to be hypnotized. After a few séances, when they find that it is inefficacious, they lose confidence again, and become discouraged, so that I am now making it a rule not to resort to common hypnotism unless I have tried every other method of treatment in vain, or in cases where the subjects are decidedly hysterical, and most especially in the case of women.

I am not unaware that we have not always the virtue of perseverance, and that our patients are very easily discouraged after a few séances that have had no effect, so that I cannot therefore absolutely deny the efficacy of hypnotism until we have adopted the method that has already been inaugurated by a few others. In this connection I must allude to the cases of Bramwell Milne (*Brain*, 1896), who had nine recoveries from various forms of obsession, thanks to hypnotism induced after a more or less lengthy preparation. I consider that he has been the most fortunate of all who have tried a similar method of treatment, and his example has not been followed by imitators so persevering as himself, nor by persons of great good fortune.

CHAPTER X

NEURASTHENIA

NEURASTHENIA is a particular state of the nervous system in which the nervous energy, under whatever form it be displayed, is below the normal minimum relatively to each individual, and below the average of the race to which he belongs. This deficiency of energy, total, or limited to certain functions, is always accompanied by a great alteration of the kinæsthetic sense in the direction of depression, by exalted emotive excitability with diminution of inhibitory power, by greater instability of character, by diminished efficacy of the product of labour, and by an extraordinary number of somatic phenomena. These last, subjective and objective, are, as it were, the conscious point of the malady, whence it radiates into all departments of the nervous activity, weakening and disturbing their connections, so that their hampered and inefficacious action aggravates the discomfort and reacts upon the character.

The insufficiency of the various functions, the sense of weariness, the pains and paræsthesias, the visceral disorders, the palpitation, or the oppression, produce an intonation of sadness and of continual preoccupation with one's own health.

It is a difficult matter to find a neurasthenic subject who is contented. Even when such a one would appear to be happy, the gaiety even going as far as the maniacal form of neurasthenia, which is very rare, such gaiety is superficial and inconstant ; it has an intermixture of other phenomena, and is characterized by great instability of the *ego*.

Neurasthenic subjects never enjoy life. As the pleasure of existence arises from the facility with which resistances are overcome without too great strain upon the organs, the neurasthenic subject who either does not overcome such resistances, or does so only at the cost of suffering, falls into a state of despair and discomfort. His painful consciousness of himself makes him acquainted with his malady, and furnishes him with matter for a pessimistic interpretation of the state of his health, and makes him take a gloomy view of his future, so that he comes to believe that he is more seriously ill than is really the case.

A sensation of tingling in the limbs on one side is associated with the fear of an attack of apoplexy. A slight tachycardia or difficulty in breathing, or a pain in the region of the heart, which is very frequent, generates the conviction of the existence of serious heart disease. Difficulty in digestion gives him the conviction that he has an incurable disease of the stomach. This preoccupation is rapidly transformed into true hypochondria, irrational, persistent, monotonous, and impervious to any reasoning. The feeling of malaise which is inseparable from the pathological fatigue prevents the development of any energy and produces discomfort.

Under the tyranny of this state of mind the neurastheniac consults all the medical men within reach, and if the malady continues, as frequently happens, he puts himself into the hands of quacks, or he tries by himself everything that is suggested by his friends, to whom he recounts his sufferings, even if he does not adopt the suggestions on the back pages of newspapers, and experiment with all the remedies extolled by the vendors of specifics for neurasthenia. With the exception of hysteria, there is no malady that presents psychic disorders so varied as those found in neurasthenia ; nevertheless, we can distinguish three groups—the emotive, the intellectual, and the somæsthetic. It must be borne in mind, however, that the three pictures presented by the disease are not perfectly distinct ; there is simply a prevalence of some phenomena, giving the malady a predominant character.

Emotive neurasthenia is often developmental, and includes the following subgroups :

1. That of the melancholiacs, who have a sad turn of mind, are easily discouraged and generally weak, taking little pleasure in anything, showing little confidence in themselves, a tendency to isolation, indifference, inhibition, fits of anguish of monotonous ideative content, fear of death, and a tendency to suicide. In slighter cases there is pessimism.

2. The group of timid subjects, who resemble the foregoing. In these patients discouragement and hypersensibility to every exterior stimulus in the social relations are predominant. If they have to speak in public they are seized with a vague fear, palpitation, real anguish, and clouding of the intelligence. This happens even to theatrical artists, students at examinations, etc., and hence such people avoid contact with the external world. During adolescence they blush and turn pale on the slightest occasion. In all their relations with their fellows there is a prevailing tendency to subjection (Hartenberg, Francotte).

3. The third group is constituted of suspicious and jealous persons, whose dispositions vary with their temperaments. They are very numerous. At bottom the suspicion, jealousy, and envy by which these neurasthenic subjects, who are often querulous and malignant, are torn, have their roots in their own weakness, and in

their uncertain knowledge of their relations to their environment. This form may remain unaltered for a whole lifetime, but it may also become the soil of development of delirious ideas (neurasthenic paranoia).

4. The erethistic form, including individuals who are often well developed in the sphere of the sentiments and the intelligence, but who are overexcited and greatly moved by the slightest stimuli, showing exaggeration in their judgments and actions, over which **they** cannot exercise proper control, and a useless expenditure of energy. They are violent, impulsive, become alarmed at trifles, and precipitate matters. Sometimes they are aggressive, and intractable both at home and abroad. This state is in contrast with their habitual goodness or serenity under normal circumstances. As a rule a gloomy disposition prevails, but, differing from melancholic subjects, neurastheniacs present greater variability of humour during periods of respite, and a constant marked weakness of the moderating powers. They furnish a certain proportion of the delinquencies of passion.

In intellectual neurasthenia the subject himself gives the measure of the loss. For some time past he has been unable to concentrate his attention (diminution of the power of attention). He reads automatically without understanding what he reads, and so he is obliged to read the same thing over again (distraction and divagation). He takes no part in conversations, because they weary him. He is no longer fit to look after the affairs of his house, because he is incapable of adding up a long account or of following a course of ideas for any length of time. His directive power over his thoughts is diminished, and other thoughts automatically break the thread of ideas, while whatever effort he can make to recover it is short-lived, and wearies him. This particular disturbance is almost never absent.

The defect of memory is notable. The reproduction of images, of notions, and of thoughts is less prompt, less easy, and less faithful, so that errors of memory are frequent, giving rise to circumlocutions when he cannot find the proper word. The weakened power of association also shows the loss to the cerebral functions.

The products of synthesis are scarcer and of low value, the flow of ideas is checked, and the imagination is very poor. States of neurasthenia may therefore be compared to states of protracted physiological fatigue. Just as the ergographic curves are not so high after protracted muscular labour, owing to exhaustion, so we find the same thing in intellectual labour. After a night's repose, or when the brain is better nourished by a well-digested meal and adequate rest, it is more productive, the imagination is more active, images are more readily called up, and the patient makes more use of his intellectual patrimony. The lowering of the mental power may go to such a length as to produce real mental confusion—the

neurasthenic stupidity of Ziehen and other authors. Sometimes this form of neurasthenia is latent, and the subjects become aware of it only after a fast or after mental labour carried on longer than usual. In such cases the mind soon loses its habitual lucidity and wealth of ideas, and the sufferers are no longer in the position to express their own thoughts in due order, according to a prearranged plan. A discourse that was to have lasted an hour in reality lasts twenty to thirty minutes, and often the most interesting matters are omitted. In these cases the threshold of fatigue is very near to the commencement of work.

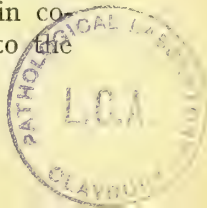
Tormenting doubt coexists with this. It extends from incapacity to come to a decision when difficulties arise in important matters, to irresolution in matters of slight moment or where the course is clear, and in its last stage it is trivial doubt in all the simple acts of life, with the characteristics of the malady of doubt described in the preceding chapter.

With the diminution of the reproductive and associative power there is often conjoined the tendency to emotive fixity of impressions. Any sensation of some intensity that determines states of emotion will remain for a long time in the consciousness. Many patients consult medical men specially or solely about tormenting permanence, in their minds, of impressions received. This is the rudimentary form of the malady of obsessions. These individuals are thus obliged to think of things they have no desire to dwell upon, and they can find no escape from this species of obsession, which lasts for hours and is renewed on every possible occasion by the most diverse causes. With this mental state there is found also a certain degree of aboulia, with predominance of automatism.

We have already mentioned elsewhere that there are men who think of doing certain things and desire to do them, but are incapable of bringing themselves to action, for this requires a higher potential of energy in order to overcome internal and external resistances (see Part II.). Thus the thought of the neurasthenic subject, even though he be cultured and intelligent, never goes beyond a soliloquy, the subject, as it were, speaking to himself about the proposed action.

This is one of the main causes of their discomfort, for it is completed action that gives an individual the consciousness of his own energy, while the man who does nothing has nothing to console himself with, and often becomes a mere critic and a pessimist.

A certain degree of aboulia is always found in neurasthenic subjects. The work done by such people is poor and interrupted, and fatigue easily and rapidly overtakes them, so that they abandon any enterprise that they may just previously have undertaken with goodwill, and with a conviction of success. Perseverance in co-ordinated work is a form of energy which it is not given to the neurasthenic to possess.



Along with weakness of will we have automatism, which may show itself in every action. The most common case occurs with the *lapsus calami* in writing, and such slips are very frequent when the brain is fatigued.

As a rule the character of the sleep is changed. It is no longer restorative, but broken and filled with tormenting dreams that leave the subject in bad humour when he wakes.

After a few hours' sleep the patients sometimes waken with a start, with a vague sense of fear or with palpitation, and they cannot go to sleep again. The more intelligent among them read, write, or walk up and down their rooms; but the others remain in bed, constantly turning from one side to the other, and at length they become frantic and despairing, and begin to foster the idea of suicide. Many people consult their medical advisers solely for agrypnia or ahypnia, and the anguish they suffer from it. Sometimes sleep overpowers them in the midst of their business, or, in the case of scholars, during lessons. This makes them despair all the more, especially as they cannot get a wink of sleep at night.

Somatic Phenomena.—Among these the most prominent are the painful phenomena, which sometimes assume the greatest importance in the symptomatology of neurasthenia. In the first place stands headache. This assumes various characters, and is variously localized, being frontal in some cases, occipital or temporal in others, and sometimes general and intense.

Frontal cephalalgia is sometimes a sense of weight; sometimes it resembles blows with a hammer, or is like a band tightly tied round the forehead; again, it may resemble a weight pressing on the head and on the orbits (neurasthenic helmet), while the eyes are heavy and painful, and compression appears to relieve them. This form is more frequent in those who have undergone very long and intense mental labour. It may be considered as an intensification of that sense of pressure on the forehead which is felt after attention with effort or prolonged mental labour, and which induces people to raise the hand to the forehead. From this sensation to frontal cephalalgia is only a matter of degree.

Occipital cephalalgia is compressive and penetrating, and causes much more intense suffering than frontal cephalalgia. It is sometimes associated with vertigo or nausea, and in such cases it is accompanied by a profound sense of ill-being, as of approaching death. General cephalalgia is darting, hammering, compressive, constrictive, etc., these being the words with which the sufferers generally express themselves. It is more frequent after sexual excesses or prolonged intellectual labour, and especially after close attention. In these cases we must take account of the position of the head. Those who study when lying in a horizontal position are much less subject to it. When one is attentive in an erect position

the muscles of the neck are tired by the flexion of the head, and pain is felt at the line of insertion of those muscles. From that point it sometimes spreads to the crown of the head or further forward. In very many cases the sensation is as though there were some barrier in the way of the ideas, forming a painful obstacle of more or less alarming character. I shall not speak of other forms of cephalalgia—for example, hemicrania—which form quite definite syndromes, and are developed on a base of neurasthenia.

As a rule, neurasthenic cephalalgia increases with labour and with fasting, and diminishes or ceases altogether after meals. Sometimes the sufferers complain of a sensation of emptiness in the head.

Rachialgia was noted by pathologists long before the clinical figure of neurasthenia had been well defined.

It has also been termed spinal irritation, and Hammond attributed it to ischaemia of the posterior columns. It is a pungent or burning pain that is felt along the spine, more particularly at certain points, from which it spreads to the trunk and the limbs. It may become excessively intense, and it continues even when the patient is at rest. Not even repose in bed will mitigate it. It causes unbearable discomfort, and may resist all treatment for a very long time.

Circumscribed spinal pains, true signs of neurasthenia, are very frequent, not to say constant. It is rarely that we find a neurasthenic subject who does not complain of a pain in the lumbo-sacral region. This pain also causes a sensation of weight, with deep-seated acute painful pressure. It is very frequent at the points of insertion of the dorso-lumbar muscles, but sometimes is felt at the sacrum, the coccyx, or more rarely the first dorsal vertebra. It is much more intense after sexual abuses, but very often it is the effect of protracted labour of the lumbar muscles in individuals who are obliged to stand a long time on their feet. I have frequently observed it in shop employees and in glove-cutters.

Other local pains (*topoalgias*) are found in neurasthenic subjects in the viscera, in the cardiac region, etc.; but they are less frequent, although they alarm the subjects a great deal more than the spinal pains. These are a veritable nursery of hypochondriacal ideas.

There are some neurasthenic subjects who, in addition to a continuous feeling of weariness and a strong desire to lie down to rest, suffer pains in the muscles whenever they make the slightest muscular effort. One will mount a horse, but be compelled to dismount in ten minutes owing to pains in the thighs, the back, and the arms, depriving him of the power to keep the horse under control. Another has to relinquish his game at billiards after a few strokes with the cue, on account of the muscular pain he suffers. When at rest, these subjects are well enough.

Hyperaesthesia is found in all the other senses. A light that is

at all intense or any loud noise cannot be tolerated, or will cause great discomfort and produce weariness. The neurasthenic subject finds that his visual power is very much diminished if he looks at a luminous body for even a very short time.

On the other hand, paræsthesia is common, especially in women. They complain of tinglings, shiverings, and sensations of insects crawling about in their hair or over their skins. They have a feeling of cold or of heat, associated with an indefinite sense of discomfort in the calves of the legs. They suffer from heat in the face, a burning sensation in the head, and scorching heat in hands and feet.

Just as the affective excitability is augmented, so the superficial and the deep reflexes are, as a rule, exalted. Neither abolition of the patellar reflexes nor complete rigidity of the pupil is a phenomenon of simple neurasthenia, and when these symptoms are found one is warranted in thinking of some other process.

Alongside these fundamental characteristics of neurasthenia, which we might regard as general, there coexist, or even predominate in many cases, functional disturbances of single organs, which sometimes become so intense as to conceal the other disorders, and give place to what goes under the name of partial neurasthenia. This latter assumes various forms.

Professional Neurasthenia (Professional Dyskinesis).—Writing for a long time causes fatigue of the nervous mechanism specialized for this function. In such a case, every time the subject prepares to write he is seized, even from the very start or after he has written a few lines, by a painful feeling of fatigue in the arm, or by a spasm that prevents him continuing (mोगigraphy). What happens to writers happens also in similar circumstances to pianists, violinists, etc.

Another person who may have worked for a long time, giving his attention to calculations—an accountant, to take a particular example—cannot make a calculation of any importance without being subject to keen suffering, and that even although he has retained all his intellectual patrimony and his habitual vivacity. Some persons who read much become so fatigued that, whenever they take up a book to read, they are subject to an undefined sense of discomfort, with pains in the eyes and occiput (anagnosiasthenia, Bianchi).

Sexual abuses, and above all misuse or nocturnal emissions, wear out the centre special to this function (impotence from exhaustion). The disorders of the sexual function are of the most varied character. Sometimes sexual desire is lacking, or it may be much more intense than is natural, but with little vigour. Erection is weak and insufficient, with rapid ejaculation *ante introitum*. Nocturnal pollutions and spermatorrhœa are frequent. There is great exhaustion, pain in the lumbar region, irritability, lowering of the intellectual powers, and hypochondriasis, especially after more or less unsuccessful coitus or after pollution.

General or partial neurasthenia is frequently accompanied by vaso-motor disturbances. Many neurasthenic subjects are very prone to blush or turn pale under the slightest impression, and suffer from palpitation, tachycardia, bradycardia, arrhythmia, or even attacks of angina pectoris, asthma, oppression, or serious disturbances of the digestion. The predominance of these phenomena has caused some to speak of visceral forms of neurasthenia, and especially of gastric, cardiac, or respiratory neurasthenia.

In gastric neurasthenia the appetite is diminished, or sometimes exaggerated, and in this case nothing can satisfy it, for there is a pressing and urgent impulse to eat. In the majority of these cases, however, the digestion is slow and painful, so that the food remains in the stomach many hours after it is eaten, and there is frequently a deficiency of the gastric secretions or some anomaly in the chemistry, such as diminution or excess of chlorides (Huschar, Leube, Bouveret). Huschar says that the innervation of the stomach is defective, and that the defect is not limited to the muscles of the stomach, but affects also the glandular secretion. There is constipation, generation of gas, and a feeling of great discomfort, sometimes pains in the epigastric region (topoalgia, Blocq), dejection, and somnolence during the hours of digestion. One of the characteristics of this form is its mutability (Linossier, '*Variabilité des sécrétions chez les neurasthéniques*,' *Bull. de Thérapeutique*, 1900, and others). The same subject will digest well one day, and not at all another day. For a short time he can digest certain foods, such as milk and eggs, but afterwards he cannot tolerate them at all, as the chemical processes are altered, and even heavier foods, such as pulse, tomatoes, and capsicums, are better digested.

In some cases intestinal troubles are associated with the gastric phenomena—for example, abdominal pain, meteorism, flatulence, and constipation (intestinal neurasthenia).

The cardiac syndrome (cardiac neurasthenia) has been known for a long time (Bouchut, Beard, Rosenthal, Anjel, Weber, and Krishaber). It is represented by an alarming group of symptoms: irregular pulse, palpitation, tachycardia, permanent or in paroxysms, pseudo-angina pectoris, with pains and anguish. Sometimes there is arrhythmia (the delirium cordis of Huschar), in paroxysms and with anguish. Sometimes also the pulse is weak and compressible, and there is a tendency to fainting attacks. In these cases, and in those with palpitation and arrhythmia, I have frequently observed that the first mitral sound is very impure, and sometimes substituted by a real murmur, accompanied occasionally by diminished arterial tension, and a slight dilatation of the cardiac area. The diagnosis can be better formulated after a few days' observation. The same thing happens with these cardiac phenomena as with the gastric—they disappear one day and reappear another.

The skin is sometimes arid, dry, and scorching, while at other

times it is cold and covered with very annoying persistent perspiration, especially in the hands (hyperhydrosis).

The tissue metabolism is by no means exempted, in proof of which it will suffice to mention the frequency of phosphaturia. In addition to those subjects who preserve their normal constitution, there are certainly others who become emaciated and rapidly lose weight, while there are others, again, who are excessively fat (poly-sarcic neurastheniacs).

Physiopathology.—The pathological concept of neurasthenia is summed up in the idea of pathological fatigue. All the psychic phenomena that enter into the clinical picture of the disease are the direct consequence of the sense of weariness, partial or general, and of incapacity, in conjunction with the psychic orientation of each man and his intellectual and emotive content, or, in other words, the individual factor.

Neurasthenia is one of the maladies that can be localized with most certainty.

In Part I. we mentioned that in the somæsthetic zone of the cortex are represented the circulation, the secretions, and all the other organic functions, in addition to the muscular sense, and the tactile sense, giving rise to that complex and obscure sensation of one's own existence that is termed kinæsthesia.

In this zone lies the nucleus of consciousness and of the joy of existence, emanating from the harmonious performance of their functions by the various parts of the organism. When it is considered that the kinæsthesia is always fundamentally altered in all forms of neurasthenia, there arises spontaneously the pathological conception of neurasthenia as a malady referable essentially to the somæsthetic zone.

It is true that the symptomatic complex of the malady, as developed in all its forms, including fatigue, malaise, incapacity, and psychic phenomena such as irritability, hypochondriasis, superficiality of judgment, deficient power of attention, weakness of memory, affective excitability, and fixed ideas, must have a much more extensive field on the cerebral mantle, and one that cannot always be defined. The partial forms are more readily localized. Mogigraphia may have its seat in the cortical centre of writing, but there is nothing that will authorize us to exclude lesion of the spinal medulla. Impotence may be spinal or cerebral. Anagnosiasthenia emanates from the centre of reading, but it may come also from the subcortical centre of the motor muscles of the eye (asthenopia).

These few considerations will convince us it is only general hypochondriacal neurasthenia that can be localized in the somæsthetic zone. Other partial forms may be localized also in other parts of the nervous system, but we cannot exclude the possibility of par-

ticipation by the senso-motor zone. To us who consider emotion as a psycho-somatic complex, inseparable in its components—representative and somatic—it does not seem plausible that there should be localization in the vaso-motor centres. On the other hand, we cannot attribute much value to the hypothesis advanced by Meynert, and accepted by some authors, among whom is Binswanger—namely, that the cortical organs are the seat of the weakness, and the sub-cortical the seat of the irritation. It is an old but unfounded doctrine, which is on a par with the other theory that the subcortical organs form a compensation for the cortical ones that are destroyed.

Pathological Anatomy.—We have rather an intuitive notion of the existence of an anatomo-pathological process in neurasthenia than any proof of it. This intuition or assumption is based on the existence of a number of forms of neurasthenia which are gradually transformed into more serious maladies.

It is well known that some cases of impotence, however much they may be treated, reappear in the course of a few years as the prelude to tabes dorsalis or to progressive paralysis. Forms of cerebral exhaustion become slowly aggravated, and in course of time reveal themselves as paralytic dementia, as occasionally happens with mogigraphia.

If to these facts there be added the positive findings in the traumatic forms of neurasthenia, for the study of which we are already in possession of experimental data, we may conclude that it is permissible to assume the existence of an anatomo-pathological process in the nervous tissue, although we cannot clearly define it.

Even at this date I cannot do better than reproduce here what I wrote some years ago on the subject of anagnosiasthenia :

‘Admitting the principle that all functions, simple or complex, are merely co-ordinations manifested by definite anatomical territories, and recognising the truth of the other principle that the functions of a given nervous territory are strictly related to the process of disintegration and reintegration of that same territory, it follows as a consequence that excessive labour on the part of a given nervous region must produce excessive disintegration, which will end in the death of the nervous elements unless we have the intervention of two favourable conditions: on the one hand, abundant nutrition, which refurnishes the nervous element with organic material to make up for what has been consumed, and, on the other hand, prompt elimination of all the products of organic disintegration. Only those elements, however, that were originally robust possess a high power of assimilation and elimination; and where this double power is unequal to the demands upon it for the performance of the function, the consequence will be either insufficient nutrition, and therefore wasting away of the nervous

element, or insufficient elimination and consequent intoxication of that element, or both of these together.

‘On either of the two hypotheses the nervous element becomes impoverished, unequal to its ordinary work, and may even die (degeneration).’ (*Di una nuova forma di nevrastenia parziale—Anagnosiastenia*, *Annali di Neurologia*, 1895.)

Ætiology.—Neurasthenia is hereditary or acquired. The first of these comprises developmental forms of all degrees. The different countries and various races are not equally subject to it. The disease is more frequent among the Hebrews (consanguineous marriages?), the French, the Russians, the Americans, and the Italians, and less frequent among the Germans and the Scandinavians.

Sexual abuse, especially if precocious, disuse, or misuse, nocturnal emissions, and the prolongation of sexual stimuli, occasion a notable number of cases of neurasthenia. The most potent cause of all, however, is onanism during the period of greatest development of the body, and at the time when the most intense mental labour is demanded in our schools and gymnasia.

In Italy a considerable contributory factor is the method and organization of our secondary schools. The multiplicity of subjects; the very frequent change of teachers for every year’s course in the gymnasium or the lyceum, with consequent change of method and of books for the same subject, particularly in the case of grammar; the disturbances to memory due to such a method; the crowd of improvised teachers who are destitute of the very elements of pedagogic knowledge, but full of Greek, Latin, and ill-digested philosophy; the slight influence exercised by the rectors over the teachers, who are left full liberty to cram into the minds of the children more than they can digest, and Heaven knows by what a method; the persistent stupidity of subjecting the youths attending the University to a very great number of examinations, and compelling them to study subjects that are frequently useless; the absence of any notion of the physiology of the mind in the case of the majority of the directors of public instruction; and the misoneism that prevails in this respect in the legislative bodies, have caused more hurt to the minds of Italian youth than anyone can imagine.

Overwork is less hurtful to adults. Still, it is certain that the mental efforts, the preoccupations, the anxieties, the multiplicity of interests, the whirl of activity, to which men are driven by their increasing wants and unbridled desires, the increased difficulties of life, ambitions, and the overmastering desire for enjoyment, result in a number of cases of neurasthenia, by no means small, especially where there is predisposition to the disease. As frequently happens, it is just under these circumstances that the subject abandons himself to the suggestive use of stimulants, such as coffee, tea, and

liquors, which are like tinder to the burning fire (Bianchi, *Il nervosismo in questa fine di secolo*, 1900). In the acquired forms we must take especial account of grave diseases of infancy and of infectious diseases, but above all of influenza. After an epidemic of influenza I observed real epidemics of neurasthenia, some of the cases recovering, but others, in predisposed subjects, being much more refractory. Malaria is not less pernicious to the nervous system. In those zones where there is intense malaria we may speak of neurasthenia as endemic. All other infectious diseases act in the same way, but less severely, except in the case of syphilis, which has a very decisive effect (syphilitic neurasthenia).

The bearing and suckling of numerous children cause a very large number of cases of neurasthenia among women in Italy, and particularly in the South, where the fecundity is excessive.

The majority of cases of hypochondriacal neurasthenia amongst women of both the lower and the middle classes are due to these causes.

Idleness is another very complex cause of different forms of neurasthenia. The want of muscular exercise or intellectual work, and consequently of that high tone and comfort that result from the accomplishment of work, a life passed simply in vain attempts to kill time, and the instincts that take the upper hand when there is no serviceable work to be done—onanism, amours, alcoholism, and card-playing—are some factors that bring about states of neurasthenia.

To all this there must frequently be added the economic misery of the middle classes and their anxieties for their very numerous families. Eight times out of ten the young or adult men who come to consult me from distant provinces, especially from the South, answer my inquiries as to their professions or vocations in a way that moves to pity.

‘What profession do you carry on?’ ‘None.’ ‘Trade?’ ‘None; I am a landowner.’ ‘Have you a large estate?’ ‘Small enough.’ ‘Do you cultivate it yourself?’ ‘No; it is let.’ ‘And what do you do?’ ‘Nothing; *I find things to do in the house.*’

In these few words we have condensed all the habits of an asthenic, miserable, unproductive, and painful life.

I must also mention briefly two other cases: intoxications and traumata. Intoxications are exogenous and endogenous. The latter will not take any effect unless the subject is very much weakened or predisposed by heredity. We must pay special attention to the intestinal toxic products and to arthritism. Exogenous intoxications are reduced to alcoholism for the most part, but to a small extent they are due also to the products of combustion of carbon, and to some other substances, such as lead, mercury, opium, etc.

Traumata produce both general and partial neurasthenias,

sometimes of a very grave order. In this form of the disease, topoalgia (Blocq) and intellectual deficiencies are particularly frequent, but simulation and suggestion also occur very often, when questions of interest to the subjects are involved, as in the case of railway accidents or accidents connected with their work.

Prognosis.—Neurasthenia is a malady *per se* (Moebius, Biernacke, Binswanger), or it is a complexity of symptoms (Charcot, Gilles de la Tourette), of which we cannot always give a good prognosis. Neurasthenic subjects are not patients who always recover readily and completely, more especially as they cannot always attain the conditions favourable to their recovery.

It is only the slighter forms of the disease that are certain of recovery. Syphilis or grave neuropathic heredity aggravates the prognosis. It is certain that those forms of neurasthenia resulting from work which the individual can abandon permit of a much happier prognosis than those other forms that depend upon circumstances from which the poor sufferer cannot escape. It is an easy matter to advise a woman to try not to have any more children ; it does not take long to tell a lawyer that he should not undertake any more cases, or to say to a clerk who writes a great deal that he should rest his weary hand ; but when it becomes a question of dying of hunger or living a wretched life, all will prefer to continue working, and that is the principal reason why there are so few recoveries.

The hereditary form is more serious than the acquired, and among the acquired forms the most obstinate is the traumatic, if we compare cases that are identical in form and intensity.

The forms of neurasthenia that are consequent upon intoxication or infection are not so serious if the cause can be removed.

The neurasthenia of adolescence is very serious, if there is a hereditary taint, aggravated by onanism and by the abuse of venereal pleasures.

Neurasthenia in women during the period of lactation generally ceases or is alleviated when the child is removed from the breast.

Periods of respite may occur in any of the forms. Many cases in which there is anguish end in suicide.

Therapy.—The therapy is ætiological and symptomatic. Causes must be eliminated wherever possible ; abuse of any kind, alcoholism, arthritism, intestinal intoxications, and syphilis should receive special attention from the physician. A rigid course of life, sobriety, and muscular energy are of great advantage. I have seen many neurasthenic young men recover their health during military service.

The symptomatic treatment varies in different cases according as the malady is erethistic or depressive. The oxygenated air of the mountains, well-regulated muscular exercises, fattening dietary

for anæmic or emaciated subjects (Mitchell's treatment), hydrotherapy, balneotherapy in its different forms, and electrotherapy (general faradization by Rockwell's method, galvanization of head and spine, galvano-faradization and franklinization) may prove of great advantage in skilled hands.

Cardiac disorders, gastric and intestinal disturbances, require the most varied therapeutic assistance, but this is not the place to discourse particularly on this matter.

The crowd of much vaunted medicines take the third place. Neurasthenia has excited the hopes of a great number of speculative chemists. From the torpid forms that require excitants, of which the chief is strychnine, to the erethistic forms that may require bromide, and the forms with anguish that benefit by opium, there are endless series of medicines, mixtures, and compositions, that should be prescribed only by a physician. Where there is a tendency to suicide, confinement in an asylum, at all times advantageous, becomes obligatory.

In many cases where hysteria enters into the clinical picture the severe but encouraging words of a physician who speaks with authority will assist more than anything else.*

* As I have had to restrict to a few pages my notice of a subject of such importance as neurasthenia, I refer my readers to the best monographs: Beard, 'Neurasthenia or Nervous Exhaustion,' New York, 1880; Axenfeld, *Traité des Névroses*, 1883; Blocq, *La Neurasthénie et les Neurasthéniques*, 1891; Bouveret, *La Neurasthénie*, 1891; Levillain, *La Neurasthénie*, 1891; Mathieu, *Neurasthénie*, 1892; Binswanger, *Die Pathologie und Therapie der Neurasthenie*, 1896; Cappelletti, *La Nevrastenia*, 1903; Carito, *La Nevrastenia e la Vita Moderna*, 1903.

CHAPTER XI

SEXUAL PSYCHOPATHIES

THE subject of anomalies of the sexual instinct has in recent years assumed remarkable proportions, and has been productive of a great wealth of literature.

For the comprehension of its anomalies we must consider the sexual instinct from the point of view of its evolutionary history, both phylogenetic and ontogenetic. Regarding them from the phylogenetic as well as the purely psychiatric aspect, we would do well to bear in mind that it is only after a long and gradual process of evolution that we have added to the spinal reflex phenomena (vaso-motor) the instinctive phenomena, which are the synthesis of sensory functions engrafted upon the organs that first fulfilled exclusively reflex vaso-motor functions.

In the higher animals all the senses tend towards the constitution of what we call sexual instinct—touch, smell, taste, sight, hearing. Some of them—smell and taste—are more immediately connected with the spinal function, whilst others—sight and hearing—favour in man the intellectual part of the instinct.

The intellectual æsthetic element supervenes only in the truly evolved man, and becomes blended with the instinct properly so called. It is represented by the æsthetic sentiment, and the intellectual, moral, and physical sympathies which favour the instinct, and hide its brutality behind the elegant curtains with which modern love screens the entrance to its abode. The intellectual components become blended with the instinctive in the same way as the latter are in function inseparable from the fundamental reflex facts.

We must bear in mind that during intra-uterine life the sexes are, for a certain period of development, not differentiated. Even after the sexual form is well defined, psychic and instinctive hermaphroditism continues during the last months of foetal development and during the years of infancy and childhood. In other words, instinctive and psychic hermaphroditism persists much longer than organic hermaphroditism. It is not till a much later period in childhood that we can detect a certain difference in the tendencies, which come into view and disappear, just like the

scouts of a slowly advancing army. The human sexuality is well defined at the age of adolescence. It is apparent that here, also, we find exemplified the common law that phylogenesis repeats itself in ontogenesis.

Furthermore, hermaphroditism lies latent even after the complete differentiation of the sexes, as shown by the phenomena of regression observed in castrated individuals and in the 'mujerados' ('*La Malattia degli Sciti*,' *La Psichiatria*, 1885).

Anomalies of the sexual instinct always occur whenever there is a disturbance of the evolutionary equilibrium of the various parts whence arises love's complex function, this disturbance leading either to a defect of one of the factors of the function or to predominance of one factor over the others, or else to an evolutionary error, both in the external organs and in the nerve-centres representing them, and hence we find a want of harmony between the organic apparatus and the sexual tendencies. All the anomalies, then, connected with the sexual instinct may be distinguished as quantitative and qualitative. Of these we shall make a very rapid review.

The quantitative anomalies are divided into deficiencies and excesses. One important group is composed of males showing sexual arrest. Physically they are males, but the penis is small and the testicles small, one or both having failed to descend into the scrotum. Sometimes they are beardless; some are slim in figure, and exhibit a sort of infantilism, even at thirty or forty years of age; others are stout and pachydermic in appearance. The sexual instinct is in some instances entirely absent, while in others it is rudimentary or simply intellectual, like a vague and timorous aspiration after woman. I have met with one or two such who were relatively more evolved and capable of fecundating. Not infrequently we find disease of the sperm (Bianchi, '*Degenerazione grassa dei filamenti spermatici*,' *Mov. Med.-chir.*, 1876). Frigidity, proportionate to the defective evolution of the sexual organs, is the predominating characteristic.

As a rule they are feeble-minded, but I have known some to be vigorous, wilful, and intellectual.

The woman of this category, like the man, is frigid, and may present anomalies of the sexual apparatus—infantile uterus, vaginal septum, etc. She is, however, very difficult to distinguish from the more evolved woman, and, in consequence, is able to find a husband, whom she marries for social reasons. The words of Rochefoucaud might well be applied to this category: 'There are persons who never would have loved had they not heard of love.' It is important to remember that the state of the sexual organs exerts a great influence upon the instinct; in some cases, for example, the frigidity lasts so long as the testicles have not descended into the scrotum.

In the woman frigidity is associated with a disheartening indifference, which sometimes leads married couples to consult the doctor. In cases of this class it is supposed that with the deficient development of the sexual organs there is a corresponding evolutionary defect of the nerve-centres.

Again, there are some men who have fully-developed sexual organs, and are, in fact, perfectly constituted and developed, presenting all the characteristics of the male, regarded both from the physical and from the moral and intellectual point of view, who, nevertheless, are either frigid from the commencement or have become so after a brief period of onanism at the epoch of adolescence or of youth. They have no desire for, and feel no attraction towards, the opposite sex ; they are, as a rule, gloomy and solitary, and seek advice and treatment from the doctor, owing to these social difficulties and the consciousness of inferiority, arising from the universal consent as to what constitutes a fully-developed man.

In another category of men there exists a marked disproportion between the sexual appetite, which is, I might say, rudimentary, and the intellectual love, which is comparatively well developed. These individuals are the excessive platonists, the idealists of love, who never find a person of the opposite sex on whom to rest their desires. Many persons of both sexes who are subject to erotic paranoia in late maturity belong to this category. This erotic idealism, which shows itself in a mystic aspiration with vague representation of the sexual life, is much more frequent in woman than in man.

As an anomaly of excess, I mention the great prevalence of erotic images and ideas that almost permanently fill the consciousness of certain persons who seem to live only to love. This prevalence may be for the most part in the ideative field, and the individuals are passionate idealists ; it may, however, affect particularly the instinctive field, in which case the subjects abandon themselves to excesses of all kinds, finding it almost absolutely impossible to change their mode of life and develop new tendencies which might modify the sexual instinct of which they have become the slaves. Men and women alike, they are in most instances intellectual weaklings, tainted by heredity or mentally unbalanced. The exuberance of the sexual instinct is detrimental to the other mental activities, and is often associated with hysteria in woman, neurasthenia in man.

This anomaly is frequent in some countries as the result of historical conditions and bad training ; sometimes it is a manifestation of a morbid state (paralytic dementia or senile dementia) ; often, however, it is an expression of sexual nature and structure. Amongst cases I remember is that of an unfortunate man, over fifty, who married a woman of his own age, a widow for the third time. He had hoped to live in peace, but was doomed to dis-

appointment, for serious trouble arose very early. On the nuptial bed the woman demanded more than was possible of a man almost fifty-five. When, ruined in health, he came to consult me, the wife, in order to humiliate the husband, who attributed his weakness to abuse, unblushingly accused him of being a good-for-nothing ! That woman, even at her advanced age, demanded every night the sacrifice to Venus.

As regards the epoch of development of the sexual instinct, it may be very late, not from racial reasons—as in the peoples of northern countries—but owing to retarded evolution (Ferrero, *La Europa Giovane*); in other instances, as in neuropathic subjects and in epileptics, it is very precocious (*vide* chapters on delinquency and epilepsy).

The qualitative disturbances of the sexual instinct are distinguished as inversions and perversions. The inversion takes the form of homo-sexual tendencies in individuals who have a more or less developed and recognisable sexual form. These are divided into two sub-groups. The first is composed of those who have sexual organs not well developed (more demonstrable in the male), and who, if males, present many features of femininity, if females, many features of masculinity; thus we may have an inverted female-form, and, *vice versâ*, an inverted male-form. The second group comprises individuals who present a regular development of the sexual organs and of the external bodily forms proper to their sex, yet have homo-sexual tendencies like the members of the first group.

An example of the first group may be briefly described as follows : A. B., male, beardless, sexual organs not well developed, two small testicles in a small scrotum, hair only on pubis, hair of head long, being cut only at level of shoulders, aquiline nose, light-blue eyes, tumid lips, large mouth, rounded form, large feminine pelvis, well developed breasts, abundant adipose tissue. He goes about with bare head, like the women of the district. He has never been capable of receiving the education of a male, but has learned to sew and to do embroidery. He belongs to a family with a history of insanity and alcoholism. Women are absolutely repugnant to him, but in the courtyard of his house, after dark, he is the constant convenience of a succession of male lovers. These latter may also be numbered amongst the sexually inverted—the podophils. It is difficult, however, to pronounce judgment upon them, as we shall see a little further on when we come to speak of pederasty.

Corresponding to the inverted female-form we have to consider the inverted male-form, with narrow pelvis, active, muscular limbs, hair on the face and on the limbs, and sometimes with long and erectile clitoris. To her man is repugnant. She prefers to dress as a man; she has a bold appearance; she loves and delights in woman. As a rule, she overcomes an exceedingly weak type of

woman, who yields to the love of the virago. Sometimes she frequents brothels in order to give vent to her prepotent instinct for woman.

Inverted female-forms and inverted male-forms both present many degenerative stigmata and many physical characteristics of the opposite sex. They usually belong to families heavily burdened with hereditary taint.

The strong type of man (inverted podophil) who yields to the invitation of the male female-form and the exceedingly weak woman who succumbs to the love of the female male-form, may show physical and psychical signs of degeneration, but these in most instances are not very marked. We may also meet with occasional inverted individuals.

Those of the second group who have inverted instincts without corresponding sexual and bodily forms are also, as a rule, afflicted with hereditary taint, but in a less degree than the others. Of two individuals who form a homo-sexual union the more degenerate is, in the case of men, the passive, in the case of women, the active.

In a separate group should be classed those active inverts who, differing from the occasional inverts, feel no attraction towards woman, and can only love persons of their own sex. Such cases, if we exclude those that are perversions consequent upon habit, are rather rare. An occasional invert may from habit become a professional pervert; he may also have an offspring in whom antipathic sexual instinct (inversion) is present *ab origine*.

Next we have the indifferent, who love males and females equally, according to the environment they happen to be in.

The inverted female-forms present, in addition, other peculiarities and differences. Some are platonists. They have an ideal love for the male sex, they are romantic in their attitudes, and are often the protagonists of the romances of sexual perversion. Others, according to Laurent, Luyt, Moll, are true representatives of passivism; they are poor-spirited, mean, given to the most debasing and injurious conduct one can imagine of a man. Such conduct may be met with even in women, as the result of habit (development of tactile sensibility through exercise). In this case we may speak of perversion rather than inversion.

In my opinion, pederasty, apart from the cases of true inversion, is more a perversion than an inversion. Wherever men who have not been accustomed to control their instincts are gathered together under conditions where it is impossible to gratify their sexual desires (military camps, colonies, prisons, colleges) we find the strong types imposing on the weaklings, the latter yielding to the desires of the former. The majority assume normal habits once the particular conditions of existence are at an end. Pre-disposed individuals may become perverts, active or passive. Active pederasts have a preference for youths of feminine appearance,

and may also have relations with women. There is often a brutish instinct present.

From these types we have to distinguish those in which the subjects are conscious of the inversion and struggle against it, with all their power, so as to avoid experiencing the shame attached to the acts towards which they feel themselves forcibly drawn. Amongst these we find both active and passive types. Here is the substance of one of several consultations: 'I seek your advice in the hope that you may save me from a position of the cruellest kind—a position that threatens to compromise my dignity and the honour of my family, and against which I have struggled from my youth upwards. I have tried to find pleasure in intercourse with woman, but I feel no passion for her, although I am able to fulfil the act of coitus regularly; I have, on the other hand, a violent love and desire for man. Prescribe something that will liberate me from this obsession.' That is a case of sexual inversion in a person morally and physically a male.

Another case is as follows: A teacher came from a distant province to consult me because for about ten years, during which time he had been teaching, he had felt a strong attraction towards the school-children, but had always been fully conscious of his position as instructor, and had retained great command of himself. Arrived at the age of thirty-six, he was irresistibly led, by the prepotency of his perverted instinct, to satisfaction, and, alarmed at an act contrary to moral and civil law, came to seek my advice. That is a case of sexual inversion with obsession.

In those cases we have examples of mild forms of sexual inversion, with fairly complete development of the intelligence, so that the anomaly is noticed by the consciousness, and the dangers attached to abandonment to the suggestion of the inverted instinct are fully appreciated.

The malady resembles in its manifestations the fixed idea or the coactive impulse. The subjects are at bottom evolved inverts, or perverts.

The same condition may occur through masturbation. There are men accustomed to masturbation from youth, who, though capable of fulfilling regular coitus, prefer to masturbate alongside the woman, rather than have regular intercourse with her. Amongst these are husbands who, sometimes from the very first day of matrimony, have obliged the wife to witness the degrading and repugnant spectacle.

In women also do we sometimes observe an insuperable repugnance to copulation. Quite recently I saw a young woman, who, during the two years of her married life, had never wished to have intercourse with her husband, whom yet she loved, and always had loved, intellectually and ardently. She had such a repugnance for copulation that at every attempt of the husband she was seized by

an inexpressible fear, accompanied by cries, cold sweats, trembling and vomiting, and no treatment was successful in producing amelioration. She was a well-formed woman, judging from external appearances. After two years of futile attempts the husband instituted legal proceedings for divorce.

Other not uncommon forms of sexual perversion are bestiality, necrophily, and sadism.

Bestiality is the copulation of man with domestic animals—dogs, ruminants, and solipeds. This condition was known to antiquity; it is frequent amongst uncultured people living in the country—for instance, among cowherds, who not infrequently have their special heifer or cow. Bestiality is not rare in childhood at the dawn of the prematurely developed sexual instinct. In most instances the perversion is determined by an impression previously received—assisting at the copulation of dogs, horses, cattle, and goats in the solitude of the country—which excites imitative acts, often through want of other means of satisfying the instinct thus excited. Even children sometimes abandon themselves to such actions after having witnessed the copulation of dogs in the public thoroughfares, and sometimes in their own homes. The instinct thus awakened is very plastic, and, the first pleasurable act fulfilled, repetition comes of itself, by force of association, especially in neuropaths in whom there is a defect in the power of resistance to this perverted instinct, and in whom there are not yet evolved the other normal factors of the sexual instinct and of love which will lead to atrophy of the perverted habit.

Necrophily consists in the satisfaction of the sexual instinct on the cadaver. In such cases we have to deal with epileptic impulses, true epileptic equivalents, or with imperative ideas accompanied by emotions and perversions. While bestiality may—at least, in its commencement—be considered an imitative or an occasional physiological fact, like pederasty in prisons, colonies, etc., necrophily must always be regarded as a pathological fact occurring in natures heavily burdened with hereditary taint, and in some way or other arrested in their mental development (imbeciles, epileptics, obsessed).

Sadism, or cruelty in love, is also a phenomenon of reversion, according to the lucid interpretation of Penta, who, in Vincenz Verzeni (a strangler of women) gives one of the most memorable examples, and finds material for a very instructive book (*I pervertimenti sessuali nell' uomo*, etc., 1893).

Sadism presents various degrees up to anthropophagy, which is the *non plus ultra* of ferocity and monstrosity in the sexual act. Just as the male wolf of the desert, in the violence of his amorous assault, bites and kills not only his rivals, but also the female, and as the male toad embraces the female so energetically that the fingers penetrate the skin and sometimes even cause death from

suffocation, so man sometimes, unconscious of all but his passion, impulsive and ferocious, becomes anthropophagic in his love; or the perversion and ferocity may reach such a point as to be capable of finding satisfaction of the instinct in the warm viscera of the murdered woman.

Sadism may be active or passive. The active form manifests itself in maltreatment or mutilation of the victim during the sexual act.

The passive form is also known by the name masochism, and consists in maltreatment, which the man, voluntarily and by invitation, undergoes at the hands of the woman before fulfilling the act, and which sometimes is even substituted for the act itself. Some beat themselves on the nates and on the chest even to bruising; others make the woman sit on and compress their chest; whilst others, again, require to be beaten to the effusion of blood in order to provoke the erection.

Sometimes the entire satisfaction of the instinct consists in these maltreatments. A well-known case is that of an impotent man who every week visited a brothel, and invited two or three women to stamp on his chest and face with shoes on their feet, after which he paid them and went his way, satisfied.

Another form of perversion consists in sexual fetishism. There we have to do with individuals who are less excited by normal relations with the opposite sex than by some object which has belonged to them, and which first provoked an unusual sexual pleasure; thus, for example, one man is excited at the sight of a hat, another by a nightshirt (Magnan, Charcot), another by a slipper, another by shoes. Whilst the female *per se* offers little or no attraction to these individuals, such trifles excite them even to the complete satisfaction of their instinct (erection, ejaculation).*

From true sexual fetishism there is distinguished amor syndochicus (syndochique, Féré), consisting in the love aroused by a part of the body, by the clothing, or by a moral or intellectual quality of an individual of the opposite sex. Since this particular part or quality is associated in the mind with an ideal type which does not correspond with reality, it happens that, whilst the amorous individual of this kind cannot abandon his victim, he does not pardon all the many defects which he finds in the latter as compared with the ideal that he has formed for himself.

* The reader who desires further particulars should consult Krafft-Ebing, *Psychopathia Sexualis*; Tarnowski, *Die Krankhaften Erscheinungen des geschlechts Sinnes*; Schrenck-Notzing, 'Suggestive Therapeutics in Psychopathia Sexualis'; Moll, *Contraire Sexualempfindung*; Penta, *op. cit.*; Mantegazza, *Gli amori degli uomini*; Lombroso, several articles in his Archives; Féré, *La Pathologie des Émotions*; Morton Prince, 'Sexual Perversion or Vice' (*Journal of Nervous and Mental Disease*); Laups, *Perversion et Perversité Sexuales*; Havelock-Ellis, 'Studies in the Psychology of Sex—Sexual Inversion.'

Amongst masochists and fetishists we may group those whose perversion is still more degrading, and who excite themselves by the urine of the female, even drinking it or swallowing other filth (cases of Cantarano).

Ætiology.—The gravest forms of sexual perversion are certainly the expression of a morbidity of the nervous system. In these cases we have almost always to deal with an inherited neuropathic and psychopathic constitution. The inversion—that is to say, the error—in the nervous system of a woman whose body is masculine, and *vice versâ* (Magnan, Gley), is undoubtedly a congenital condition. This statement is especially confirmed by those inverted males or females who have some of the bodily features of the opposite sex. We may hold that in these cases either the embryonal hermaphroditism is transformed into more or less complete somatic mono-sexuality, but with an opposite psychic mono-sexuality remaining, or at a somewhat more advanced stage it stops at psycho-sensory hermaphroditism.

From this point of view, and looking to this single category of cases, I fall in with Krafft-Ebing, Moll, Kiernan, Chaddock, Lydston, Penta, and others, who hold more or less the congenital nature of the sexual instinct. This hypothesis is not applicable to all cases. Most of the other forms of perversion owe their origin to an occasional factor, which, given the neuropathic constitution of the subjects, and hence a less degree of resistance, gives rise to the habit, and with the habit comes the perversion. The cases of fetishism, for example, have been in great part of occasional origin in eminently neuropathic individuals. Sometimes heredity is reinforced in the sense that an occasional abnormal inclination may in the offspring become an organized and fixed manifestation. The doctrine of acquisition is upheld by many, amongst them Laups, Schrenck-Notzing, Binet, and Havelock-Ellis. The prevailing notion is that occasional impressions excite desires and lead to acts, these in turn giving rise to sensations and ideas which become imperative. Pleasure and the means of attaining it are two indissoluble elements, and, when the mind is filled with thoughts of pleasure, it is difficult to decompose that psychic product so as to obtain from it a more normal compound. This is possible only in the most fully-evolved natures.

Pederasty, like bestiality, is almost always the result of circumstances. The amorous inclination for youths arises in the adult from the sight of forms not perfectly differentiated, as is often found in youth (examples: Alfieri, Rosseau). In some neuropaths the impulse and tendency to indulge in love with youths become obsessions. Masochism is often an unconscious adaptation by impotent individuals to an intensification of the tactile stimuli, by means of painful stimuli, in order to attain the end of copulation.

Heredity almost invariably plays a part, often giving rise to a similar anomaly, which in the offspring is reinforced. The sexually weak father begets the son similarly weak, frigid (psychic hermaproditism), or inverted. Weak mental development, feeble power of resistance to momentary impulses, which tend to become fixed, explain all the other phenomena.

In many of these cases where the sexual organs are well formed we get an anomalous testicular secretion, with absence, scarcity, small size, or fatty degeneration of the nemasperms (Bianchi, *La degenerazione grassa dei filamenti spermatici*, 1876). The nature of this work does not allow me to enter into fuller details concerning this matter. The subject is one requiring more accurate examination, and a larger number of observations than have hitherto been made. In this respect it has been somewhat neglected.

The *prognosis* varies in different cases. Inverts with somatic characteristics of the opposite sex are incurable; psychic inverts with regularly developed organs are more hopeful.

Defects of development manifest in the organs are almost incurable. Frigidity may be modified by appropriate treatment along with exercise. Sadism comes under the domain of the penal code or of the asylum, as do also anthropophagy and necrophily. It is a difficult matter to find the time and the means to treat them.

The coactive impulses come under the study of fixed or imperative ideas.

Therapy. — To improve the functional tone of the nervous system, to strengthen the predisposed physically and psychically, is the chief and fundamental duty of the physician, who must also impress on public administrators the necessity of adopting strict measures to prevent children receiving impressions that prematurely arouse and pervert the sexual instinct. He must strive to cure impotence, which is the instigator of a number of methods that give rise to perversions. Education to a more normal sexual life, conducted on strict lines that, in cases not really congenital, break the old and create new habits, has in several cases given me satisfactory results. Suggestion, recommended by Morton Prince and other authorities, may give like results in the case of fixed ideas. The best form of suggestion is that coming from persons who can exercise authority, and especially from the doctor, when the circumstances permit its association with sexual re-education.

CHAPTER XII

SECOND GROUP—GENERAL CONSIDERATIONS

I HAVE already referred to the pathological conception and given the basis of this second group (Part III., Chapter II.). The diseases herein included are produced through the entrance into the blood of endogenous or exogenous toxic substances which are of bacterial origin, or due either to anomalous chemical products of the tissue metabolism or to abnormal intestinal fermentations. Some of the diseases of the first group are likewise of toxic origin. It is sufficient to recall here myxoedematous idiocy and infantile encephalitis (whence arise the already studied forms of phrenasthenia), the abundant literature dealing with the toxic genesis of epilepsy—literature, however, which leaves in our minds a great many doubts—also the hereditary toxic genesis of the majority of the diseases of the first group, such as alcoholism in the parents, infectious diseases of the mother during gestation, syphilis, tuberculosis, etc., as demonstrated by the experimental researches of Maffucci, Féré, and Ceni.

We have also indicated the reasons which induced us to distinguish the diseases of the first group (of possible hereditary toxic genesis) from those of the second group (of direct toxic or infective genesis). The febrile deliria, which are sometimes continued under the form of psychoses; the psychoses and neuroses that occur as sequelæ of influenza (very frequent), typhus, small-pox, etc.; the psychoses arising from intestinal intoxications and coprostasis in the same way as encephalitis, acute myelitis and neuritis, now shown to be of toxic or bacterial origin, likewise the results of all the researches made on the blood and the urine of those patients (increased toxicity); the frequent presence of micro-organisms in the blood of the acutely insane; the resemblance of these psychoses to those of exogenous intoxication due, *e.g.*, to alcohol, sulphide of carbon, morphine, cocaine, etc.—all these go to demonstrate the rationality of the differentiation of this group from the first, a differentiation equally rational from the ætiological point of view.

Whilst in the first group the disease lies in the psycho-physical structure of the individual and of the family, in the second it is imported by an extrinsic or intrinsic factor always toxic in nature.

It is well to note that the diseases of the second group generally affect those who present a significant cerebral vulnerability, usually hereditary. It serves no useful purpose, either from a practical or from a purely theoretical point of view, to distinguish the diseases of this group as degenerative psychoneuroses and psychoses. This distinction has now served its day, and incurability cannot be employed as the basis of a rational distinction. Acute dementia may be followed by recovery, or it may take on all the features of dementia præcox, apart altogether from the nature of the soil in which it is developed, and that we may not know. Exposed to the action of exogenous or endogenous intoxications, well-developed brains, as well as those not perfectly developed, are vulnerable. Thus it is that many hereditarily weak-minded individuals are subject to the acute diseases of this group, inasmuch as their brains are more readily affected by the action of toxic substances; in this respect, however, they differ in no way from men well developed in body and mind but with a hereditary taint. In other words, their brains exercise a much less destructive and phagocytic power over the toxic substances which find their way into the blood; the histo-chemical structure of their nervous elements is less resisting, or, in other words, the chemical substances composing the nerve-elements show greater affinity for the toxic substances.

Imbeciles and those of defective evolution subject to these acute forms of curable and incurable psychosis are very numerous, but that does not detract from the fact that, in their clinical aspects, these psychoses may, from their origin, evolution, and issue, possess characters so very salient as to justify their being grouped together, their precise ætiological indication determining also a more rational therapeutic treatment.

It is therefore worth while recalling attention to the fact that, whilst the common infective diseases present a well-defined clinical form with respect to the pathogenic agent, so that we have a considerable knowledge of the micro-organisms and the toxins of enteric fever, small-pox, plague, and diphtheria, etc., this particular is completely wanting in acute mental affections. The same toxin may produce very different forms of psychosis. Just as acute alcoholic intoxication may produce exhilaration in one person, sullenness, melancholia, and weeping in another, or induce motor inco-ordination or staggering in a third, and headache in a fourth, so may all the other toxins behave. The same toxic properties of the urine and of the blood serum, and the presence of the same micro-organisms in the blood, coincide often with the most diverse forms of acute insanity. Here the individual factor is to be reckoned with.

I am well aware that some, such as Ceni, do not think thus. Following upon a certain number of observations, in which he found a fairly large number of the more common varieties of micro-organisms (*Streptococcus pyogenes*, *Staphylococcus aurea*, *Bacillus*

coli, and others) in the blood of several patients suffering from acute psychoses belonging to the group with which we are dealing, notwithstanding that their presence coincides with an aggravation of the psychosis and their disappearance with an improvement, Ceni has believed himself warranted in concluding that pre-existing psychosis diminishes the phagocytic power of the blood and the tissues, and permits the entrance into the blood of these micro-organisms which would only induce an aggravation, an acute episode of the primary psychosis.

Regis has taken a clearer and wider view of the matter ('*Auto-intoxications et délires—Psychoses d'auto-intoxications: considérations générales*,' *Brochure et Archives de Névrologie*, 1899); so also has Ford Robertson ('The Role of Toxic Action in the Pathogenesis of Insanity,' *British Medical Journal*, 1901). The French author attaches less importance to infections and too great importance to auto-intoxications, as observed in deliria from renal, hepatic, and gastric intoxications, etc., whilst the very competent pathologist of the Scottish asylums brings forward interesting material with regard to observations of great value for the solution of the grave problem. However it may be, and with due reservations respecting the relations between the genesis of insanity and the primary cause determining it, the fact remains that from all sources fresh confirmation is being received every day that the group of diseases with which we are dealing is of toxic origin.

When we consider that the brain is a mechanism of marvellous complexity, the aggregate of a very great number of organs which do not all attain the same degree of harmonious perfection, nor enjoy the same power of resistance, we can well imagine the great variety of clinical forms arising from pathogenic agents which injure one more than another of the cerebral organs; and this fact also corresponds to the predominance of certain psychic components which give to the structure of each personality the stamp of individual character. It is for a like reason that polyneuritis is, in many cases, not accompanied by mental disturbances, while in others there is produced the form of psychosis described under the name of polyneuritic psychosis, and that influenza produces in one melancholia, in another mania, in a third sensory delirium, and in a fourth polyneuritis.

Summing up all the preceding arguments, we may say that, with regard to the diseases of this group, it is impossible to speak with the strictest accuracy of a definitely established relation between nosological form and specificity of the pathogenic agent.

The literature of the subject, especially the Italian, is so rich in facts that it would be useless labour to relate here even a few of them. The splendid and full report by Professors d'Abundo and Agostini to the Congress of Italian Phreniatrists, held at Naples in October, 1899, may be advantageously consulted in regard to the subject.

CHAPTER XIII

MANIA

SOME authors, following the views and classification of Kraepelin, would include melancholia and mania, as well as the periodical and circular forms of these psychoses, under one denomination, and regard them as different forms of one morbid entity, to which the name of maniacal-depressive insanity has been given. According to Kraepelin, melancholia and mania are gradations of the same disease. This manner of looking at the subject is, in appearance, justified by the facts that melancholia is often preceded or followed by a short or a long phase of exaltation ; that mania is very often preceded and also followed by a phase of melancholia ; that in many cases the attack consists of a period of melancholia lasting for months or years, followed by a maniacal period, also of months' or years' duration, and *vice versâ* ; that an attack of melancholia or mania may be followed after four, six, or more years by an attack of an opposite form ; that, in short, the circular form of this psychosis goes to demonstrate the tendency to both depression and exaltation in the same patients, and hence the reason for including the various syndromes in one single pathological conception which may embrace them all, and in a single clinical picture, with its nosological varieties. Nevertheless, long and close observation of patients for decennaries on end demonstrates undeniably that, besides all the clinical forms indicated above, there do exist cases of pure mania and pure melancholia, which are neither preceded nor followed by phases of a contrary form, and which either do not repeat themselves, or do so only at very long intervals (ten to fifteen years) with the same or almost identical characters.

To the small group of pure forms should be added that larger one of the periodical forms of the same nature. Amongst these pure and periodical forms are the relapses at intervals of from five to ten or more years.

The relapse and the length of the interval do not alter the nature of the disease, but they reveal the nature of the soil in which it is developed. I do not, therefore, see any reason for the dis-

inction between psycho-neuroses (the first) and degenerative psychoses (the second). The characteristics of the pure forms repeat themselves in the successive attacks, and the only difference is in the greater depth of the impression which the first attack leaves on the mind. When the disease discloses itself in persons imperfectly developed, symptoms of an anomalous character creep into the picture (childishness, paranoidism, selfishness, impulsiveness). In no case, however, should these be confused with maniacal-depressive insanity.

The fact remains that, even within the limits of normal life, there exist opposite temperaments, which preserve the same features from adolescence to maturity. Some present an appearance of sadness, have a strong tendency to view the dark and perilous side of things, are dull, meditative, quiet or timid, even when they are endowed with strong intellect and a resisting character; they are not fond of bustle or of cheerful company; some are even pessimistic. However little these characteristics may be marked, we recognise in them a rudiment of melancholia.

Others present an opposite character: they are always ready, rapid in their actions, cheerful, high-spirited, often superficial, fond of stir and company, carrying wherever they go gaiety and good-humour. The embryo of mania is represented in this character: both temperaments are lasting—they are constitutions.

It is certainly true that, if towards the decline of life an individual of happy disposition becomes insane, the insanity will very probably take the form of melancholia. I have seen several instances in predisposed persons, but the explanation is to be found in the fact that the sadness which overtakes the mind when maturity is passed and old age is coming on is usually much more intense in these gay subjects, stamping on the diseased mind the characters of restless or agitated melancholia.

Here the law of contrast plays its part. To these stable characters there correspond pure psychopathic forms which cannot be confused with the other psychoses.

For this reason, which is in agreement, if not with the statistics, at least with the ideas of Gucci (*Rivista di Patologia nerv. e ment.*, 1899) and with those of Soukhanoff and Gannouchkine, I hold that we ought to preserve in the nomenclature, existing as they do in fact, pure mania and pure melancholia, and that with these ought to be aggregated the relapsing and periodical forms, making a group quite distinct from the above-mentioned maniacal-depressive forms, which we shall describe in a separate chapter.

Pure mania is relatively rare. A certain number of manias of the old authors must certainly be classed with other psychoses better known to-day, and especially with sensory delirium, progressive paralysis, epilepsy, and hysteria. The existence of mania

has been wholly denied by some, but, according to my view, wrongly. Taalmann, for example (*Allgemeine Zeitschr. f. Psych.*, 1897) is amongst these, struck by the fact that out of 105 cases admitted as mania, the diagnosis could only be upheld in four. In my opinion greater reliance can be placed upon the statistics of Hinrichsen, who has found, relatively to the cases of periodical and circular insanity, a proportion of 4·7 per cent. of mania ('*Statistischer Beiträge zur Frage nach der Häufigkeit der einfachen acuten Manie*,' etc., the same periodical, 1898). I cannot be sure of my statistics on this question; some cases of periodical form may be included amongst cases of genuine mania. I have been able, however, to follow several patients, one of them for twenty-two years without any recurrence, and this justifies the title of the chapter.

The frequency of mania must certainly be influenced on the one hand by the character of the race, and on the other by the more or less exact method which is followed in the examination of the patients. Out of an average annual admission of 400 patients, I have not always found, during the lecture courses, a typical case of mania to present to the students, and that, too, in face of a great prevalence of sensory insanities and melancholias. Seeing that mania is a little more frequent in the Sicilian than in the Neapolitan, it is not improbable that the humble character of the workman and of the whole body of the people, tinged with the true sadness that exists even in the middle classes through poverty, disguised though it may be by the bustle and gaiety attending the drama of life, may be one of the causes of the rarity of a disease which, until a few decennaries ago, was held to be very frequent. It figures in my statistics in the proportion of 2 to 3 per cent. of the admissions, but it is to be observed that this figure is obtained from the nosographical diagnosis of many patients, and, in a great centre like Naples, is due to the want of an assured control of the facts which precede the confinement or succeed the often hurried discharge of the patients. It is more frequent in women than in men. Out of 1,367 males admitted to the asylum at Naples during the sexennial period 1894-1900, twenty-five were affected with mania, whilst amongst the females the number of cases of mania was also twenty-five, but that out of a figure of 830 admitted during the same sexennial period.

Compared with melancholia this proportion is very low. Out of the same number of admissions during the same period there were 109 ascertained cases of melancholia amongst the males, and 116 amongst the females. Again, if we subtract from the cases of mania the periodic and alcoholic forms, the figure is much more reduced. This fact shows how erroneous may be the opinion pronounced by Leloyer (*Les Spectres*, etc., 1888), who declared mania to be frequent in Italy, especially amongst the excitable populaces of the provinces of Abruzzi, Calabria, and Apulia.

Puberty and adolescence predispose to it, but it is observed in all ages, although it is more rare after the age of fifty-five. Mental worry, strong emotions, reverses of fortune, fears, scanty nourishment, hæmorrhages, exposures to the sun, traumatic affections of the brain, and a few drugs, such as salicylic acid (Robinson, Reid) have been mentioned as causes of mania; but, apart from those cases depending on intoxication from alcohol and salicylic compounds, these causes act by preparing the soil for auto-intoxications.

Mania consists essentially in an emotional disturbance of the personality, the tone of which becomes altered in the direction of pleasing, cheerful sensations. There is a prevailing consciousness of the pleasure of living, and exaltation of the *ego*, which becomes exuberant, strong, assured, often haughty. For the maniac there no longer exist any difficulties or internal or external resistances. He abandons all the polite aids (delicacy, propriety, opportunity, etc.) which make instinctive life difficult, and which adapt it to so many new exigencies.

The maniac is a person who is cheerful, hilarious, talkative, facetious, sometimes generous, often intolerant. The potentiality of the peculiar attitudes of the consciousness increases in proportion to the exaltation of the feeling of strength and health.

The reflective power is diminished and reduced to a minimum, even to complete disappearance, and the afflicted one abandons himself to a thoughtless life, or engages in arduous or dangerous undertakings beyond his real physical and economical potentiality. The diminished resistances leave free course to words and actions that are useless and often incoherent. As he has nothing in the past or in the present with which to reproach himself, moral sentiments having disappeared, the thought of something that will give him pleasure finds a ready passage to the field of action. This does not depend upon a preponderance of the reflex motor apparatus of the cortex, to the exclusion of the higher centres, as held by some German authorities, who, with marvellous confidence, localize melancholia and mania in determined cerebral mechanisms. Putting aside the imaginative nature of these authors, concealed behind promises of anatomical and physiological positivism, we have the fact that the tension and the high motor potential in the motor centres arise from the fundamental sentiment of the exalted *ego*, which gives pleasure, and from the increased tension in the whole cerebral field (images and ideas) with progressive loss of the selective power over the ideas, and the prevalence of the simpler or older mental organizations, which discharge themselves through the shortest circuits.

In the turmoil the highest products of thought and sentiment are overthrown by the sensory throng, which normally raises the motor potential. The time of reaction and of discrimination is diminished, even to the point of disappearance. At the same

time, the tone of the organic life is much strengthened. The circulation is more active, respiration more ample, the appetite stronger, digestion often more rapid, the muscular force more resistant, sexual instinct keener and less easily appeased.

We distinguish three forms of mania—the *mild* form, or *hypomania*, the *typical*, and the *grave*.

Mild Mania.—In this form change of sentiment is much more pronounced than ideative derangement. Here, more than in the other forms, we have revealed the true nature of the disease, as a disturbance of the sentiment and tone of the mind. There precedes often a period of some days, and even of some weeks, during which the subject observes a varying number of derangements: bad digestion, constipation, want of appetite, a dry tongue, heaviness in the head, a feeling of heat, headache, mental dulness, bad humour, affective irritability, a sense of weakness, sometimes fits of hypochondria of short duration, and sleep interrupted or disturbed by bad dreams. Then one day or other all is changed, sometimes almost in a moment, and most frequently on awakening in the morning. The subject is conscious of a feeling of lightness and well-being: the kinæsthesia is much heightened, the head is clear, ideas flow easily, and the mind is serene; there succeeds a feeling of well-being, internal resistances disappear (the annoyance, weariness, sufferings, muscular weakness), the appetite is improved, and a true joy invades the mind.

The patient's gaiety much exceeds the bounds of physiological happiness; he feels a great desire to move about; he is strong, self-confident; his life is free and unhampered in whatsoever direction his activity may be; he is hilarious, facetious, loquacious, likes the company of friends, and searches for them in their houses and places of resort, feels the need of doing something and of diverting himself, drinks more than customary, and the sexual instinct is louder in its demands than usual. In this state of the feelings and of the mental disposition, arising in its turn from the exalted kinæsthetic sentiment, the sensibility to pain is diminished, the intellect, moreover, becomes keener and more active, perception is more rapid, and the memory ready and faithful, but the associative hyperexcitability and the exuberance of ideas lead to judgments sometimes strange and paradoxical; the language is more abundant, the tone of the voice higher; the patient, if educated, solves with greater ease rebuses and charades; lucid ideas come with greater facility, succeeding and pursuing each other, and retaining fair logical relations with one another, save for certain strange relationships which the maniac sees between things and appears to understand between ideas, thus endeavouring to conceal the eccentric and even paradoxical nature of his judgments. Amongst friends, and sometimes also amongst strangers, he is emphatic;

he writes a great deal in prose, but more especially in verse ; he is witty, ironical, and sarcastic, sometimes unseasonably so, with but little reserve, and sometimes even obscene. The power of attention being diminished, the psychic processes are rendered facile, hence the ready resolution of all the motor intuitions, free from the restraints of the inhibitory powers, now weakened and overcome ; not infrequently he becomes insolent, and acts in a perverse manner when contradicted in the home and outside. He displays quite a great activity, is never at rest, does not sleep at night, makes a number of resolutions, followed by a single attempted action. In this these sufferers show a notable defect of the will, as proved by the fact that after recovery they declare that they were unable to restrain themselves (case of Forel). Sometimes the resolution is stronger, when the idea of an undertaking is longer nursed, in view of the brilliant success promised by the individual's activity, which has been excessively increased in proportion with the feeling of health and the readiness of the intellect. Through a process of allegorizing his vigour, the maniac no longer sees obstacles to the carrying out of his projects.

Misfortune does not affect him ; he can borrow money, feeling certain that in a short time he will make a great fortune out of his undertakings. A condition of psychic arrest is, nevertheless, not rare, as has been observed also by others (Kraepelin, Weygand).

In some it is a case of exaltation of the *ego*, without or with a relatively limited rush of ideas, accompanied, however, by excessively facile motor reactions, with a hostile and aggressive attitude, for which reason the sufferer cannot tolerate opposition to his assertions. Above all, over close relations and friends he assumes unwarranted authority, and acts with violence.

In some cases, instead of exaltation of the intellect with a rush of ideas, we get efflorescence of the instinctive life, which procures enjoyments, unhampered by the restraining powers, weakened as they are by disease.

In all its manifestations the exaltation draws its character from the normal mental disposition of the particular individual : thus it is that a doctor speaks of being a great clinician, discovering remedies for incurable diseases ; a modest surgeon becomes a sure and successful operator ; a priest becomes a great preacher, his talent being unequalled, his conversation brilliant ; the commercial man is head over ears in business. In these fiftul assertions, often made under the pretence of jest, we perceive the germs of grandiose deliria which flourish in the more intense form of mania.

With the psychic exaltation the somatic phenomena take their place in the clinical picture. The tactile sensibility is exalted, the muscular force is somewhat increased, although disordered, the threshold of fatigue is farther off, the circulation is more active, the pulse of high tension and increased in rate (from eighty to

ninety beats in the minute), the face more lit up, the eyes sparkling, the temperature normal, or a few degrees higher, the appetite usually increased.

Typical Mania.—In this form the exaltation is much greater. The disease loses the characteristic of a profound alteration of the sentiments and mental disposition in the direction of a feeling of pleasure, joy, hilarity, contentment, strength, and activity, or irritation, and assumes more the appearance of a grave disturbance of the intellect. Whilst in the mild form the reasoning process is preserved, allowing at the utmost original, or paradoxical but true, associations to be perceived, in the typical form these associations, which give at least the appearance of reasoning in what we consider sometimes as originality, eccentricity, singularity, are broken by the rapid



FIG. 81.—EXAMPLE OF TYPICAL MANIA.

onrush of the psychic waves. The predominant phenomenon is a great flow of ideas, which resolve themselves into movements with a rapidity and muscular elasticity sometimes surprising. Every sensory impression produces an effervescence of images and thoughts, which in turn translate themselves into words and acts; every idea has behind it a number of others with the relative motor intuitions, which are free from any restraining influence whatsoever, or any process of selection. All crowd on the motor paths, and thus arise the great unrest and the extraordinary and incoherent loquacity of such patients.

As can be readily understood, in this case the incoherence depends upon quite a particular mechanism: given the exaltation of the psychic activity, any external or internal stimulus puts in motion and effervescence a great part of the psychic patrimony. The

lower and the higher elements mingling together, all in a turmoil, throng the threshold of consciousness, which in turn is unable to arrest or hinder any of them, and the way being clear, free vent is given to all the intellectual components of the excited and troubled personality. The inhibitory powers are rendered unfit to perform their functions. The tone of the mind is hilarious or irritated, unrestrainedly and excessively merry, or foolish and aggressive. The individual is not only loquacious and incoherent in his extraordinary talkativeness, passing giddily from one thing to another, according to the variety of the stimuli, but sings, bawls, skips, runs, stamps about, whistles, insults, threatens, spits, makes obscene gestures, exposes the genitals, abandons himself to lewd acts and erotic invitations, divests himself of his clothes, and tears and destroys them if he meets any obstacle. Whilst in mild mania there is a tendency to write verses in large, unequal and sometimes disordered handwriting, in the typical form the writing is much more irregular, the sentences are half written, the lines incomplete, the characters large, and neologisms and symbols are found in great number. The maniac does not bend before difficulties ; if he is kept at bay, especially by members of his own family, he breaks out into violence, becomes hostile, threatening and destructive. At a moment's notice the personality abandons the hilarious habit and gets into a passion, asserting the *ego* with great violence, without regard, scruple, or remorse. This condition of things persists for several weeks or some months, there being only brief truces ; sleep is much diminished, and during the night there is continued, sometimes with greater confusion, the dancing and singing which have marked the day.

Sensory disturbances almost always exist ; illusions depending on the images that occupy the consciousness at any given moment are very frequent ; they are very fleeting, have no hold on the mind, and do not determine any secondary judgment, much less any change in the humour.

With regard to hallucinations, although nearly all authors speak of their presence in this form of mania, I am inclined to believe that they are very rare. What we have in this case is really a matter of very vivid and coloured images depending on the exaltation of the whole psychic sphere, and we shall at the very utmost be able to speak of psychic hallucinations. From accurate observations of several cases of pure and typical mania, I am led to exclude the presence of true hallucinations from this psychosis, and to hold that their supposed prevalence arises from an erroneous interpretation of the manifestations of the patient ; or, if present, they are really episodes of exaltation of other psychoses, or of the maniacal forms of sensory insanity, which in the past has certainly been confused with pure mania.

As a rule, expansive deliria flourish from the very outset. The

exaltation of the *ego* animates them. They are changeable, fleeting, like dazzling lights, ever flitting from place to place. Maniacs are rich, have possessions, are great commercialists, are very capable, and have unsurpassable talent. These deliria are often mixed promiscuously with ideas of persecution, with religious deliria, and with just ideas; they often last for some time after the rush of ideas has ceased. Whilst substantially the *ego* is hypertrophic and reactive, the delirious manifestations are only an unnecessary coat which the patient often recognises as not belonging to him.

The instinctive life is also profoundly disturbed: such patients eat inordinately, do without a spoon, prefer taking their food with their fingers, soil themselves, eat greedily, drink by lowering their mouths into the dish, throw on the ground the plate with part of the food, are extremely greedy, sometimes disgusting. They urinate wherever they are, even in presence of others when the disease is becoming chronic, and defæcate in the room, never seeking to go to the water-closet. They take no care of their persons, are negligent, wear filthy clothes, unbuttoned and torn; their hair is dishevelled and beard untrimmed.

They are obscene in speech, but no longer enterprising in love, as in the mild forms. In bed they are restless, assuming the strangest positions, removing mattresses, coverlets, sheets, rolling themselves up in the bedclothes, and having no repose.

The physical phenomena are also more evident in this than in the preceding form. The reflexes, normal in the mild form (Agostini), are often exalted in the typical.

When the excitement is strong and prolonged, the patients lose weight, even although well nourished, but more especially if they are originally badly nourished and anæmic, a condition of affairs by no means rare. The acidity of the gastric juice is increased (Leubuscher and Ziehen). The pulse, which at the beginning is strong, of good tension, and rapid, at length, if the attack is not short, rises frequently beyond 100 beats, and becomes small and compressible. The arterial pressure is found, by means of the manometer, to be increased by several millimetres at the beginning of the disease. In the early stages the face is usually lit up, the eyes are bright, the palpebral fissure increased, in some cases like the eye in the disease of Flaiani. The pupils are equal, and react readily. In this respect my personal observations contradict the assertions of some authors (Schotze, Ball, Regis, Wagner, Mendel, Krafft-Ebing, and others), who noticed, even in the interparoxysmal periods, inequality of the pupils. I have reason to believe that even during the time when such observations were made true mania was confused either with sensory delirium (maniacal form), or with the maniacal stage of progressive paralysis.

Grave Mania.—This form consists of an aggravation of all these symptoms, with an exaltation which reaches the degree of destructive fury directed against both persons and things. It may be held that the fury described by some old authors is only a very fleeting phase of typical mania, or one of the forms that clinical and psycho-pathological investigation has differentiated and distinguished to-day, such as acute sensory delirium, acute delirium, the epileptic equivalent, and progressive paralysis.

The *duration* of the disease varies from a few weeks to two or more years. The attacks are shorter in youth than in advanced age. Sometimes in adult life and in the presenile period it assumes the chronic form, which is prolonged for years, with the same mitigated characteristics, and in most instances terminates in dementia.

Diagnosis.—Pure mania must be diagnosed from the history of the whole disease, which begins with the same symptoms as distinguish it throughout. The want of a true melancholy period at the commencement of the disease, except for the prodromal period of malaise, such as occurs in almost all acute diseases, and which must not be confused with a melancholy phase, the pre-vaillingly cheerful tone of mind, and the extraordinary facility with which all the psychic processes are manifested with intellectual vivacity and abundance of ideative products, however deranged, the slight influence possessed by the various sensory disorders, owing to their slight intensity and feeble determinative power as compared with those observed in so many other psychopathies, are all sufficient data to distinguish true mania from the exaltation which is met with in many other mental affections. The absence of true phenomena of dementia, the subtle spirit which maniacs show, their ironical sayings, their ready memory for poetry and prose formerly forgotten, and the absence of somatic phenomena such as tremors, inequality of the pupils, initial disorders of speech-articulation, abolition of the patellar reflex, etc., permit in the greater number of cases the differentiation of mania from the exalted form of progressive paralysis.

From the maniacal manifestations of epilepsy distinction is made by the history of the case, the anthropological signs, the great impulsiveness, and the irritability. The functional marks of hysteria—the greater mobility of humour, the prevailing mystic and erotic disposition, and the previous history—will facilitate the diagnosis of maniacal-hysterical insanity.

The *pathological anatomy* of mania is not known. The congested states met with by the old authors are not characteristic of mania, and cannot be attributed to it, since in the past mania has been confused with other states of exaltation well defined

to-day. Mania may even be accompanied by anæmia of the nerve-centres (Mirto). The manias which complicate grave infective diseases are of rather too complex an origin to allow of a definite post-mortem finding. Even the more accurate researches, like those of Orr ('A Contribution to the Pathology of Acute Insanity,' *Brain*, 1902), who found in some acute forms of insanity marked chromatolysis and eccentric displacement of the nucleus, have not advanced our knowledge of the subject under consideration, because these same alterations are found also in other psychoses; and, on the other hand, these acute forms of insanity cannot be held to be typical or grave forms of mania.

The nuclear proliferation found by Repping, the fatty and pigmentary degeneration of the nerve-cells, the chromatolysis with increase of neuroglia found by Anglade, the granular myelinic alterations found by Mirto, and some other analogous findings, do not, in the present state of our knowledge, warrant us in defining the pathological anatomy of mania. The autopsy of one typical maniac who remained excited and lucid for more than two years, then died of pneumonia, revealed a splendid hyperæmic veining of the dura mater, which was rose-coloured, and of the pia mater.

Prognosis.—The prognosis is in most cases favourable. Only the grave forms unduly prolonged in weak, anæmic persons are dangerous. Eighty to ninety per cent. of cases recover. The prognosis, however, ought always to be guarded in view of the future, since there remains a tendency towards the repetition of identical attacks, especially in the young, or a tendency towards establishing some periodical and circular forms which leave little or no hope of cure. The fact is that in a case of mania the clinician has no means, if it is the first attack, of distinguishing the pure from the periodical or circular form. The cure may be instantaneous, and happen in consequence of intercurrent diseases, after blood-letting (Raggi and Bergonzoli), pleurisy (Willerdich), or pharyngitis (Schultze).

Therapy.—From the very beginning of the disease the maniac must always be isolated. In contrast to the melancholiac, who can be kept at home, surrounded by domestic affections, the maniac must be removed from the stimuli of variable surroundings which in different ways increase the potential of excitement in his brain. Restlessness and enterprise associated with great deficiency of the restraining and critical powers, expose the maniac to certain ruin, and the facility with which he reacts on his surroundings in an impetuous manner, without measure, and without a just appreciation of the acts he performs, are manifestations of the necessity for confinement. We may except very mild forms where the disease makes the person affected agreeable—of course, only up to

a certain point—but in all other cases the maniac is not a patient to be treated in his own home. Wherever he is kept, one indispensable condition is that he be removed from the greatest possible number of stimuli. As to the means of restraint, experience teaches that the more free and in the open the patients are left, the less are they excited.

In the first days of the attack there is nothing so efficacious as aetiological treatment: to purge the intestines, disinfect them with copious washings, and to practise abundant hypodermic transfusions on alternate days (in the typical and grave forms), is the rule followed in my wards. The application of leeches may be useful in the graver cases and where a congested state of the head appears very evident. Tepid baths have been much recommended, the baths being prolonged from one to eight hours at the temperature of 34° to 35° C., with or without cold douches or cold compresses on the forehead.

The food during the first days ought to consist of substances which give the smallest quantity of ptomaine. I am in the habit of excluding flesh meat from the dietary of these patients. Milk and farinaceous foods are the most suitable. After the first weeks are passed it is no longer beneficial to keep the patients on this diet, since the morbid manifestations depend on changes that have already taken place in the cortical elements of the brain.

In these cases the symptomatic treatment gives poor results. A very large number of sedatives and hypnotics have been recommended, with but temporary success; among these are chloral, paraldehyde, bromide, sulphonal, morphine, hyoscine, duboisine, etc.

Except bromide, which can be given freely without injury or danger (4 to 5 grammes per day, with 4 to 5 drops of tincture of hyoscyamus freshly prepared), and sulphonal, all these drugs are more or less insidious—hyoscine and duboisine more so than any of the others, so that, after a period of trial, I have given over the use of these latter in my practice. With the others it is necessary to be sparing. It appeared to me that the prolonged use of any of these hypnotics did not facilitate the cure, and, above all, did not shorten the course of the disease.

CHAPTER XIV

PURE MELANCHOLIA

THIS is essentially represented by a change in the affective tone of the personality in the direction of a painful feeling, accompanied by a slowness of all the psychic processes, amounting even to psychic arrest and to static concentration of thought on distressing subjects, with a tendency to disjunction of the personality, which depreciates itself to the humblest form, and even to definite suppression of the *ego*.

Some hold that it is the concentration of thought on painful subjects that puts and polarizes the mind in a painful state. Experience demonstrates the great prevalence of the sad humour, reaching even to anguish, and this necessarily is associated with the distressing and monotonous content of the intellect. Whichever be the mode of commencement of the disease, it is certain that these two facts coexist and represent, together with the inhibition, the integral elements of the disease, which in the somatic field is represented by all those functional modifications accompanying the emotions of grief and fear (*vide* Part II.).

According to Kraepelin, the melancholia which develops before the age of thirty is never a simple form; as a rule it ends either in dementia præcox or in circular insanity. This issue takes place whatever be the form of melancholia, and even when the perceptive process is preserved.

In my opinion simple forms of melancholia certainly do exist, even amongst young people; such, however, are much more rarely met with, and may terminate either in recovery or in dementia. The latter issue does not change the character of the disease as a simple psychosis. Relapses occur in identical forms, sometimes owing to changed organic conditions, such as the puerperium; but even in this case we cannot speak of relapsing melancholias analogous to the periodical, as Jolly formerly observed.

This observation of mine, made quite a number of years ago, agrees in almost all respects with those of Sachs (*Statistischen Beitrag zur Kenntniss der einfachen u. periodischen Melancholie*, 1899), who found an almost equal number of persons suffering from

pure melancholia in the third, fourth, and fifth decennaries, in contradiction to that doctrine which teaches that melancholia is a disease of involution.

If melancholia is to be regarded as a disease of incipient senility, as is maintained by Kraepelin and many of his followers, this can be admitted in a psychological sense only, and not in the strict meaning of the word. In fact, Arnaud (*Rivista di patologia nervosa e mentale*), in an analysis of 162 cases of melancholia (100 females and 62 males), found the disease in all ages; the greatest number occurred in middle age.

Certainly, in the majority of melancholiacs we find a lowering of that vital tone characteristic of youth and maturity, and a notable deterioration of the whole organic function, sometimes connected with true organic lesions and with all the signs of a premature senile involution; but the indisputable existence of pure lypemania in the third decennary of life, which either ends in recovery or relapses after many years, contradicts the generalization of this conception.

We distinguish different forms of melancholia.

Simple Melancholia.—This first form is not very rare. In it neither hallucinations, illusions, nor deliria are met with; often, indeed, the individuals affected are more than usually lucid.

This melancholia without delirium is represented by a state of low spirits and dejection, and by intense, continuous moral suffering, with profound and invincible discouragement. There is perfect mental integrity, save for the concentration of the intellect on sorrowful subjects, whilst the personality is attacked by a keen and killing frost, which freezes up every internal or external source of joy. A letter written to me by a young man who consulted me affords an example. I gave him words of encouragement, and for some days he showed himself somewhat comforted, and hoped for cure. Here is the letter:

‘SIGNOR PROFESSOR,

‘I have until to-day followed out with the greatest diligence the treatment you prescribed for me, and I hoped to obtain from it a little improvement. Alas, what a rude awakening! I am still as unhappy as ever, with this difference, that whilst formerly I nourished a little hope, now I despair of ever becoming well. A formidable barrier has been erected before my mind, and it obtrudes itself so inexorably on me as to drive away from my mind, if I can say I possess one, the very shadow of hope.

‘In this indefinable state the idea of suicide presents itself spontaneously and opportunely to my mind, but before I embrace it I wish for the last time, through you, to entreat science to use the means, if any there be, to combat my fatal disease.

‘I foresee too well the answer, but I wish to indulge a little longer in unfounded hopes. Do let my painful position impress itself upon you, and consider a little what unhappiness and grief I suffer in feeling myself apathetic, unconscious of myself, morally insensible—a mere automaton, yet fully aware of my moral nullity.

‘With the most passionate and intense prayer for help and relief that has ever gone out from a human heart I turn to you, most esteemed professor. I hope you will not remain insensible to misery so great as mine, but be willing to interest yourself kindly in a young man who, still in the bloom of youth, finds himself forcibly drawn into the most cruel dilemma—on the one hand, a wretched existence ; on the other, death. Truly, for me, death and my present life mean the same thing, since I am now morally nothing but a brute, or little better than an animal obedient to instinct.’

In this letter we have all that is necessary for forming the clinical picture of simple melancholia.

The formidable barrier to which the young man refers is only the psychic coaction which prevents the ideas and the acquisitions constituting the mental patrimony from passing into the field of consciousness, which instead is flooded by an immense and indefinable anguish and by groups of ideas relating to profound sadness.

There is always present in melancholiacs a feeling of darkness and despair of ever again finding joy in life, and hence arises the tendency to the suppression of the proper being.

From the moment courage fails them and they no longer feel affection, when hopes have ceased to urge them and ideas to nourish the consciousness, when neither desires nor wishes move them and interests no further sway them, and when, instead, grief reigns supreme, invading and conquering the whole being and begetting weariness of life, then the personality is potentially suppressed.

The wretchedness of the *ego* and the nullity to which it recognises itself reduced, suggest the quality of brute or animal, which the melancholiac attributes to himself because he no longer feels any of those virtues from which flows the joy of existence, and the absence of which gives the conception of unworthiness that characterizes this morbid state.

In general, melancholiacs, even before falling ill, are morally hyperæsthetic. This condition becomes accentuated in the form of melancholia, but at the same time the victims become self-centred. Their own intense suffering makes them insensible to that of others ; they speak only of their own afflictions, and like to publish them to the world.

Another characteristic of the disease is despair. As long as there remains a ray of hope, the disease is not so grave ; confirmed melancholiacs do not hope—all is finished, all is lost for them.

Moral insensibility, of which the young man speaks in his letter, is another phenomenon frequently observed. There are some who grieve because they have no affection for anyone, and because they are entirely without feeling : the mother is distressed that she has no longer love for her own children ; the father frets because he no longer feels interest in the management of his business, etc.

When there is consciousness of paralysis of the affective and intellectual capacities, the personality sees itself reflected in the

world, wretched, reduced, and ruined, and that which is the effect becomes a cause, and so increases the grief.

When it happens that grief has invaded the whole soul no other escape presents itself than suicide, which is inevitable, being the last reflection of a psychic personality that is dying, dragging with it into nothingness the body now no longer in harmony with it.

The melancholiacs of this category are usually gloomy, solitary, torpid; they no longer frequent places of amusement where life manifests itself in the pursuit of pleasure, where there is found the relaxation that follows work, where the story of the day is rewoven, and a new page written in the memory of each one; neither do they go to the theatre, where a number of sensory and æsthetic pleasures soothe the soul and fit it for the struggle of the morrow. For melancholiacs Nature holds no further joys, Art is mute; all things are in contrast to their grief; everything increases it, nothing alleviates it. Caresses, comforts, encouragements, either have no beneficial effect or at most a very fleeting one, and may even have the opposite effect of increasing their sufferings (psychalgia). They suffer from precordial pain and fits of profound discouragement. They feel as if a knot were in their brain, torturing and frightening them. The fixity of ideas gives rise to true obsessions, and makes them despair. In this state they lose all touch with the social world, and abandon every enterprise: they have no hope of success, no courage to confront difficulties; nothing interests them any longer; they become fretful and tired of everything; and as time goes on the anguish increases, like an ever-increasing tension, till it reaches the limit of the mind's capacity, when it discharges itself violently in destructive action against persons and things, or even against themselves (raptus).

At other times they are in a constant state of unrest. They go about seeking comfort from doctors, from many doctors, from friends and relations: they cannot do otherwise, for they become disheartened when alone; they speak of nothing but their malady, and are monotonous, always returning to the same theme—their grief, their unbearable suffering, their desperation, their unhappiness; no one sufficiently understands them; no one can comprehend how much they suffer. Often they do not sleep; they lose all appetite, no longer enjoy their food, decrease in weight.

Closely related to the moral grief, and sometimes occurring as a primary fact, there is almost always fear. Grief and fear are two aspects of the same emotion; fear of something is the apprehension of injury therefrom, and hence a grief. There are individuals, however, who, apart from what they know from personal experience or have learned from others, have fear of the unknown. In this case we have an indefinite fear which does not reduce itself to the concrete. That which is beyond the limits of our knowledge weighs like an imminent danger, just as the

night-time impresses deeply on the timid soul the silence of Nature. Melancholiacs with a timorous disposition are, as a rule, panophobists.

Melancholia with delirium is the most frequent of all the other mental affections of antiquity. We find a very considerable diversity with regard to the psychic content.

In Saul the melancholic content of thought was the curse of God, because of his faults; in Nebuchadnezzar, King of Assyria, the degradation of the proper personality translated itself into giving effect to the belief that he was transformed into a beast.

In the Middle Ages there were real epidemics of melancholia with demoniacal content. Thousands of individuals believed themselves possessed by the devil and transformed into beasts (lycanthropy).

There were patients of this form of melancholy, to whom were given the name of lupomaniacs, who infested the country districts to such an extent as to cause special laws to be promulgated, like that by the English Parliament in 1573, which gave permission to the country people to hunt the lupomaniacs who roved about the districts. Legal proceedings were instituted against those possessed of devils and against the supposed sorcerers, and laws were made by the Parliaments of Rouen (1643) and Provence (1611), etc., legalizing the tortures of the stake.

To-day melancholia has assumed another character: lycanthropy has become rare, and every year melancholia with demoniacal delirious content is becoming less common.

Melancholia, like many other mental diseases, reproduces in the tints of the disease the character of the individual and of the times.

In simple melancholia grief is more intensely felt than in melancholia with delirium. Interpretation is like the appeasement of the grief, which is aggravated when it does not rest on any subjective reason.

Delirium is, as it were, an outcome of the original sorrowful tension. It has been very often affirmed, especially by the German alienists, that it is developed through an allegorical interpretation of grief, as by a process of reasoning, through that tendency of the spirit to seek the reason of things and of phenomena. Investigations into the nature of the patients, their ancestors and their tendencies, have furnished me with positive results as to the true genesis of such deliria.

Leaving out of account those of hallucinatory origin, I have found that, whilst some deliria, such as those of witchcraft and sorcery, arise by a logical process from interpretation, the greater number of them arise through psychic contrast (*vide* Part II.). They are always preformed ideas associated with the emotion of

fear of any danger whatsoever, in contrast with normal ideas which prevent those mental productions from becoming active. The disintegration of the personality, an effect of the pathological emotions, suppresses the normal ideas of contrast, or deprives them of the power of resisting the invasion of the antagonistic ideas.

The preformed ideas vary in nature according to the individual and social circumstances of each person.

Many of these false conceptions lead to conclusions of personal unworthiness. The melancholiac judges himself unworthy; his personality is debased and humiliated, and so he accuses himself of sins and crimes which he never committed.

Exaggerating the trifling and insignificant facts of his previous life, he affirms that he has committed the most unlawful actions, has broken laws human and Divine, has committed sins unpardonable in the sight of God, is irreparably lost and damned. He pictures to himself hell, fire, devils, and the terrible punishments that await him. These are the so-called deliria of auto-culpability, auto-accusation, demonomania, damnation, and perdition. The last two deliria represent judgments of social vengeance: for the faults committed he will be arrested, tortured, executed; not only he, but also all the members of his family, will have to undergo the most atrocious punishments. From time to time he is seized with real fits of grief and anxiety, thinking that the officers of justice are at hand to arrest him and carry him off, with his family, to horrible prisons, and he regards everything as lost.

Another form of melancholic delirium is that of negation in the widest sense of the word. The dissolution of the personality reflects not only the *ego*, but also that part of the personality which is included in the *meum*, in so far as it is an integral part of it. In this case the melancholiac affirms that he no longer possesses anything, that he has ruined himself and his children; he does not know what to do; he has no longer the wherewithal to sustain life; his children will have to beg their bread, and undergo the greatest humiliations and the most atrocious punishments.

Some others affirm they have lost not only their fortune but also their family; they have no longer wife, children, or friends; they are alone in the world. Proof of the contrary, in fact, does not remove this false conviction from their minds.

There may also be a delirium of persecution. In this case it differs from that which takes place in the paranoic subject, intense fear, anxiety, and psychic arrest predominating. Frequently it is the delirium of poisoning, of poisonous substances being in the food and drink. The conviction of being a victim of witchcraft or sorcery constitutes a delirium from interpretation, very similar to the delirium of persecution.

The hypochondriacal delirium is not rare; it is often maintained by intestinal disturbances, dilatation of the stomach, eczematous

eruptions, and in alcoholists by paræsthesias and pains in different nervous regions.

In these cases the patients affirm that they suffer from serious heart disease, that the blood does not circulate, the bowels do not move, that the brain is broken up, and that worms swarm in the cranium. This delirium sometimes grows worse, assuming the characters of the delirium of negation (see Part II.). The patients thus affected suffer great agitation and violent terrors.

All these deliria indicate a reduction of the *ego* and the imminent danger which threatens it.

In other cases the *ego* is transformed (metabolism), and here we have several factors at work. Through psychic arrest, which prevents the representation of the various images and also of a



FIG. 82.—REPRESENTATION OF A WOMAN SUFFERING FROM MELANCHOLIA, WITH DELIRIUM OF NEGATION AND ANGUISH.

small part of the intellectual patrimony, and through the absence of the various sentiments, so frequent in victims of melancholia, it is no rare thing for some of them to arrive at the false conception of being no longer the same persons. These are the more grave cases of lypemania. The disease begins with the patient's feeling out of sorts; he suffers from insomnia and a distressing inability to direct his energies; a phase of anxiety and agitation follows. The sufferer, with a frightened face, only gives vent to sighs and exclamations,—‘What am I to do?’ ‘O God, I am lost!’—and incessantly paces the room with his hands clasped or thrust into his hair. After some weeks of this anxious and agitated form of lypemania (melancholia), during which time hallucinations are common and delirium of negation becomes pronounced, the patient loses the thread of the history of his proper personality:

he no longer possesses anything ; his estates and money exist no more ; the house he lives in is no longer his own ; the members of the family who assist him are no longer his relatives ; nothing in the house—neither furniture nor clothes—belongs to him any longer ; he no longer possesses anything ! Thus one by one the components of the psychic personality are suppressed : on the one hand, the ideas and sentiments ; on the other, all the components of the *ego* included in the *meum* ; and, with this profound alteration of the kinæsthetic feeling, the personality no longer recognises itself historically, and is no longer capable of appreciating its relations to time. The consequence of this state is the negation of the *ego*. ‘I am not X,’ said one lady to me ; ‘she exists no longer. A great catastrophe has occurred and led to her disappearance. You wish to call me X, but she whom you call X knows not whence she comes, when she was born, nor how she comes to be here. I see A, B, C’ (her sisters, whom she mentioned by name), ‘and I know that you are Professor Bianchi ; but Mrs. X, whom you believe you are visiting, no longer exists.’ Her recollections extended up to the ‘great catastrophe,’ which, as a cataclysm, had overthrown everything, and in which she had been shipwrecked ; she had a confused memory, like a dream, of the original X, and could not account for her present existence ; she was of mysterious origin, and alone in the world. The perception of things and of persons existed, and also the process of recognition ; but the fundamental ground of this process having been changed, the recognition of things did not transport itself into time, and did not find the elements of identity in relation to the proper person.

Melancholia with delirium may give rise to two successive transformations, but this is rare. In some cases there is developed a delirium of persecution which assumes many of the characters of the delirium of persecution that we find in paranoiacs ; these are cases of what Roncoroni termed *paralypemánias*.

In other cases, and particularly those in which the negativism has been most profound and the personality reduced, there springs up a delirium of grandeur which mingles itself strangely with the delirium of lypemaniacal negation. Having lost the historic thread of its own existence, the new personality conceives the idea of immortality. Not having been born, it cannot die, and will therefore be immortal ; if immortal, then, in logical sequence, there arises the conception of divinity. Such a case has been described as follows by Magalhaes Lemos (*Évolution des idées délirantes dans quelques cas de mélancholia chronique à forme anxieuse*, XIV^e. Congrès intern. de Médecine, Porto, 1903). It resembles, in most respects, cases of Ségla and others, and is confirmed by my personal experience. The patient, always of a humble spirit, now fathoms the mystery of the universe ; he speaks of being contented now, because by dying he enters into the joy of eternal rest, which

is supreme happiness. Condemned to suffer for all mankind through all eternity, he must be burned in steam-engines, in forges, and in all the furnaces of the world ; he will everywhere take the place of oil and wood when these fuels become exhausted, and will give to the world movement, heat, and light. One of my patients thus became ' Christ exalted to the glory of the heavens and gone up from human woe to mitigate the effects of human misfortune.'

Simple melancholia as well as delirious melancholia takes two forms—the passive, which goes as far as the stuporous state (*melancholia attonita*), and the agitated.

Melancholia attonita presents various degrees. There is the patient who stands in the corner of the room, with pale face, relaxed features, downcast eyes, wrinkled forehead, and a sad expression. He is careless and negligent in his dress, his voice is feeble and slow, his hands are crossed, and he is timid and passive. Then there is the patient who, dismayed by the delirious representations of the great sins he has committed, and by hallucinations of hell, devils, fire, is restless and agitated. The first remains stunned, motionless, with frightened face ; he offers a certain resistance to passive movements ; he expresses no desire, makes no demands, looks for nothing, obeys no one ; as a rule he declines food, is with difficulty made to eat, and, in fact, most frequently he has to be fed through the nasal tube. He does not move from the spot to empty the bladder or rectum, but wets and messes himself. At length he becomes cyanotic ; the temperature at first is febrile, then subnormal, the pulse weak, the extremities cold and œdematous, and nutrition fails.

Such a state is interrupted by brief fits of agitation and of raptus. If he recovers, he remembers the state of his mind during this period.

This form of melancholia is much rarer than is generally believed. Even very recent writers, like their predecessors of old, confound stupor or stuporous states with *melancholia attonita*. Only rarely does the melancholiac become katatonic, and in such cases there is very often a mistake in diagnosis. In any case the katatonic condition is an episodic fact related to hallucinations and the episodic confusion arising therefrom.

Melancholia agitans is represented in the grave forms by agitation, continuous and unvarying from the very outset, and very often animated by deliria, anxiety, and grief. After a few or many months, if calmness does not supervene, the excitement may become stereotyped, reproducing almost rhythmically the same movements and the same phrases.

One patient paces regularly through the room, continually exclaiming : ' O God, I am lost ! What am I to do ?' Another, in tones of anguish, repeats : ' I am damned !'

The hypochondriac is continually relating his sufferings, and

gives himself up for lost. One young woman suffering from melancholia used to weep aloud from morning till night, tearing her clothes and her hair; another patient brought to the asylum after having attempted suicide by throwing himself from the window of his house, has been unable to get out of bed owing to multiple mal-united fractures, and in his great agitation has, for about four years, sat up in bed, swinging himself backwards and forwards, the while exclaiming in mournful and rhythmic tones: 'O God, I am lost!' Now and again he has more severe accessions, tears his hair, beats his breast, and rends his clothes. For about a year these fits of raptus have been much rarer, but the attitude and the exclamations, now stereotyped, have remained. Other patients, again, have incessant suicidal impulses.

The agitated form of melancholia may occur as an episode in other forms, or persist throughout the illness from a few weeks to several years.

The lypemaniac is almost always dangerous. Along with the anguish, either simple or associated with deliria, the idea of suicide *always* exists, with more or less marked tendency to carry it out. In this connection investigation in all cases has resulted in confirmation of the general law. Melancholiacs may kill their dearest ones (the mother her own children) in order to release them from the atrocious sufferings of which they believe them to be victims; they accuse themselves of great crimes which they have never committed; they resign situations, believing themselves incapable of discharging their duties; they mutilate, when they do not kill, themselves, in punishment of some imaginary offence. A patient in my clinique cut clean away his genitals—penis and testicles; he recovered.

With these psychic conditions, characteristic of melancholia, whatever its form, coincide a number of somatic phenomena, some of which are concomitants of the emotional states—grief and fear (see Part II.)—while others have been made known to us through researches in melancholia. Diminution of the red blood-corpuscles was found by Seppilli, and afterwards by others. Whilst in mania there are found, on an average, 4,470,000, in melancholia the average is only 4,000,000; the relation to the leucocytes is usually maintained. The hæmoglobin is diminished in more than half the cases.

In the urine the phosphates in general are diminished, but especially the alkaline phosphates, whilst indican and, according to Marro, scatol are increased. Sometimes albumin is present and the toxicity of the urine increased. Nutrition fails, the patients lose weight, if not always—as Kaes would have it—certainly very frequently.

The blood-serum is toxic from the beginning, especially in the grave forms; inoculation of culture media is often positive.

Muscular force is diminished. From a series of ergographic researches carried out in my clinique by the accomplished Dr. Barbato, the evident result is a low level of the ergographic force, which demonstrates that the affliction induces a centripetal orientation of the nerve-waves, and hence a great difficulty in the manifestation of the centrifugal currents.

In addition to the slight elevation, there are to be observed in the ergographic curves irregularity and want of harmony, which is the mark of disintegration.

All forms of sensibility are diminished ; the superficial and deep reflexes are normal.

Appetite fails, digestion is difficult ; very frequently there is constipation ; the breath is often foetid or acetonc, especially in the acute period of the disease. Sexual instinct is extraordinarily depressed, sexual appetite almost always wanting.

The pathological anatomy is uncertain. Cerebral anæmia, admitted by the greater number of old and recent writers, is only an organic phenomenon associated with the fundamental emotional state characteristic of melancholia, and cannot be invoked as an anatomo-pathological substratum of the clinical syndrome.

Turner demonstrated alterations of various degrees in the nerve-cells, and deduced arguments in support of the view that they were due to toxic impregnation of the nerve-elements (*Brit. Med. Jour.*, 1901).

The researches of Stewart Paton disclosed homogeneous coloration of the cells (fever change). There are no alterations of the nerve-fibres or of the neuroglia.

According to Alzheimer, the alterations in melancholia can be presumed rather than demonstrated, all the more so that in the present state of our knowledge we cannot attribute the psychic phenomena of the disease to a given cerebral region. In the climacteric melancholias Alzheimer found, in addition to the changes in the ganglionic cells, a notable increase of neuroglial fibres and proliferation of the cells in the deepest layers of the cortex.

Whether these alterations may be found in one part of the cerebral mantle more than another only future researches will tell. The hypothesis of Hollander, who sought to assign a seat to melancholia, is far from being proved. Hollander (*The Journal of Mental Science*, 1901), has collected about fifty cases, consisting mostly of traumatic lesions in the parietal region and vicinity, and on these he is inclined to base the existence of a relationship between the central region of the parietal lobe and melancholia.

This hypothesis derives even greater probability from the profound alteration of kinæsthesia, and also the fear which characterizes simple melancholia. It is well, however, to observe that the kinæsthesia is altered also in mania, neurasthenia, and progressive paralysis. We can at the very most affirm that the tactile zone,

which is the most important centre of kinæsthesia, is chiefly concerned in melancholia.

The *ætiology* is the same as in all the other acute psychoses. We have to deal with predisposition from heredity and other causes which reduce the nutritive and phagocytic power of the organism (previous illness, exhausting diseases, mental worries—especially the death of dear ones—intense fears, insufficient food, hæmorrhages). All these causes act by producing a state of hyponutrition of the central nervous system. Involution, asserted by Kraepelin, is not constant.

Melancholia is certainly much more frequent in the fourth and fifth decennaries than in the earlier years of life, and the reason is not difficult to understand when one remembers that these decennaries represent the age of the strongest conflicts and the keenest struggle for existence, in which humanity often succumbs. This is the age in which fears and griefs are mostly accumulated, often not counterbalanced by the joy of victories that give self-confidence, and by the consciousness of vigour. The melancholiac is a weakling, not an involute. Certainly in the fifth decennary the signs of organic involution frequently make their appearance, but the very large number of melancholiacs between the ages of thirty and fifty confers no value on the assertions of those who regard melancholia as a disease of involution. It is rare in the young, because in early life the exuberance of spirit and the limited experience of difficulties encourage that reliance upon the personal vigour which is to lead victoriously to the desired goal.

For similar reasons it is less frequent in men than in women. It often coincides with the climacteric period (presenile melancholia); in the very young it is usually the effect of excessive onanism. Women who are pregnant, and especially those who are so for the first time, supply a notable proportion of melancholiacs (anxiety about the birth, circulatory disturbances, pregnancy, intoxications). Chronic alcoholism is not alien to its *ætiology*.

The *diagnosis* of simple melancholia is comparatively easy, except with regard to neurasthenia. In the latter the depression is more superficial, offers more hope of recovery, is often interrupted by phases of cheerfulness; the psychic arrest is much less, and concern for one's own health predominates. In melancholia intense grief, psychic anguish, persistent and desperate, and wretchedness of the personality are characteristic.

In the delirious form the diagnosis presents fewer difficulties. The deliria described are almost exclusive features of melancholia, only we must bear in mind the possibility that the melancholia is an initial phase of progressive paralysis. In the latter, along with melancholic deliria, we meet with mental decadence, some of the

somatic phenomena of progressive paralysis, and sometimes the automatic rising of some grandiose idea, which seems out of place in the midst of all the melancholic formations of that period of the disease.

Much less easy is the diagnosis between melancholia attonita and stupor, or melancholic mental confusion. Here the history of the initiation of the disease affords more assistance than the state of the muscles (relaxation or hypertonia), or of the pupils (dilatation, contraction, or rigidity) which may be found alike in both diseases. If the malady commences with vivid hallucinations we have probably to deal with the melancholic variety of hallucinatory insanity. The typical forms of katatonia are not present in melancholia, except as fleeting episodes.

The difficulties in the way of deciding whether a first attack of melancholia is a pure, periodical, or alternating psychosis, are often insuperable. The occurrence at a very early age would tend to the exclusion of the pure form, and that without sharing in the exclusiveness of Kraepelin. The circular and periodical forms are not very rare in the fourth and fifth decennaries of life. Marked heredity and psycho-somatic degenerative stigmata give us cause to fear the beginning of the disease in the periodic and circular forms.

The *prognosis*, for the foregoing reasons, presents great difficulty to the clinician, because, confronted by a first attack, he finds it no easy matter to give a decided opinion as to its nature—whether it is pure or not; then, admitted that he has succeeded in recognising it as a pure form, the question arises, Is it one of those which are curable? The age of the patient is often no positive aid, because melancholia is cured at all ages; even in the aged recovery is not rare. Advanced involution, confusion associated with deliria and hallucinations, rapid mental decadence, automatism, and stereotypism are all evil omens. Melancholia attonita is more grave than the simple and delirious forms. Intense, sorrowful agitation is always an alarming phenomenon. Intellectual obsessions aggravate the prognosis.

Some authorities consider the prognosis to be always, or almost always, grave when the case is regarded as either periodical or maniacal-depressive insanity. I look upon Kraepelin's statistics, showing, out of thousands of cases of mania and melancholia, only one in which there was no relapse, as being greatly exaggerated.

Roncoroni and Sanna Salaris from 1891 to 1896 observed eleven cases of melancholia which, up till 1901, had not relapsed. I have observed many cases in which there has been relapse after a period of ten years. Now, it is clear that a relapse after eight, ten, or fifteen years cannot be put in relation with the first attack, unless to indicate that it is the worries of life that prepare the conditions favourable to a repetition of the disease.

The lady who presented the metabolism of personality described, was ill for the first time in 1883, at the age of thirty-six years. She fell ill again of the same form in 1896; the attack lasted three years. In 1904, she was enjoying the most perfect health.

Therapy.—The treatment of melancholic patients bristles with difficulties and dangers.

The suicidal tendency, and the refusal to take food are two menaces for the physician, whose first duty it is to put the patient under constant and careful observation.

Recreations and travels are of assistance in only a few cases of simple melancholia. As a rule, everything that affords pleasure in the normal state is received dolefully by the melancholiac, and is therefore injurious. At the beginning of the disease good results are obtained from lavage of the intestines and the stomach, and from hypodermic transfusions, especially when phenomena of intoxication appear strongly evident. This practice, followed in my clinique in recent cases—and such cases are becoming less numerous (observations by Galante)—has given good results.

The diet should be varied: milk, vegetables, leguminous and farinaceous foods, with flesh meat, ought to prevail.

Tepid baths in the excited and agitated forms, light hydrotherapy with douches in the stuporous, torpid forms, galvanization of the vagus nerve, and general faradization by the Rockwell method, are good helps.

Open-air, sunlight, excursions into the country, short readings, or simple games (in the mild forms), are always preferable to the indoor atmosphere and to inaction. From this point of view good asylums and sanatoria, provided with fields and gardens, are preferable to the treatment of the patient at home when favourable conditions do not prevail there.

In some cases rest in bed is helpful, but then hydrotherapy, massage, and electrotherapy should be employed.

Pharmaceutical remedies have a double object—to raise the general conditions and the arterial pressure, to lessen the mental pain and the insomnia. The first is attained by the use of ferruginous medicines, arsenic, cod-liver oil, glycero-phosphates, strychnine, digitalis, adonis; for the anguish and insomnia, opium in doses increasing to 1 gramme a day, injections of morphine to the extent of 6 centigrammes in the twenty-four hours, cannabis indica, and hashish, will be useful.

If the patient refuses food it is necessary to have immediate recourse to artificial feeding through the nasal tube.

Bromides in general exercise a depressing action on the function of the heart and arterial tension, and, although recommended by some authors, are in my experience injurious.

The *periodical forms* of mania and melancholia almost always preserve the same characteristics and maintain the type unvaried, save for the sometimes progressive aggravation of the attack in its intensity and duration.

Clinical observation, free from preconceptions, compels us to consider the periodical forms of insanity apart from maniacal-depressive insanity. One cannot confound maniacal-depressive insanity with mania or melancholia which, during relapses, always presents the same characters, or with any other form of insanity which, in its recurrence, preserves its physiognomy. Confusion is not justified from either the clinical or the psychological side. My point of view in this matter coincides with that of Hitzig, Pilcz (*Die periodischen Geistesstörungen*, Jena, 1901), and many others.

The attacks of melancholia, as well as those of mania, in the respective subjects, are very similar to pure attacks—that is to say, without concomitants of contrary form. The maniacal attack begins and finishes as mania, gradually settling down into the normal state, and so with the melancholic attack. The duration of the attack varies very much in different cases, sometimes lasting only a few days, sometimes extending over a year and more, and usually with each fresh attack there is a tendency to its prolongation, whilst the type is preserved.

The mild type of mania, for example, is often preserved in many successive attacks, but in time it frequently assumes the characteristics of the typical form. Usually in the same individuals the attacks correspond to certain seasons, some particularly to spring, others to autumn. Many patients know that they will fall into the morbid state in April, in August, or in October, and they consult the doctor beforehand, in the hope of being able to prevent the recurrence of the attack.

It has been much discussed, especially by forensic physicians, whether the free interval between two attacks ought to be considered as one of perfect mental sanity.

Accurate psychological analysis of many of these patients has convinced me that unless the attack is followed by signs of mental decadence, which is very slow in confirming itself, the free interval coincides with complete mental sanity—that is, if we except signs of psychic degeneration or of anomalous character existing previous to the attack, as often happens.

At the very utmost we may speak of a great cerebral vulnerability which is usually increased by repetition of the attacks.

There is nothing to be added with respect to the nosographical picture of the disease, the characters of which are in all their gradations the same as those of mania and melancholia, even in their smallest particulars.

We possess no data enabling us when dealing with a first attack of melancholia or of mania to foretell whether it is a pure, a periodical,

or a circular form. One sole indication, and that not in all cases, is derived from the knowledge of the mobile character of the patient previous to the attack (frequent and irrational alternations of the mental disposition).

The one important feature is in the prognosis, which is grave ; but this can only be reduced to the concrete after a year or so. When the disease is repeated a second time, especially if the first attack has been of long duration, one may be almost certain that it will be repeated at determined periods. It has happened occasionally that the disease has missed a season, and then resumed its course in the following year.

Sometimes the attacks do not return at determined and almost equal intervals, but occur very irregularly, and as the result of circumstances that are not always discoverable.

In some the cerebral vulnerability is such that the smallest opposition may determine the onset of the attack.

I have patients who remain even more than a year in the fixed and uniform surroundings of the asylum, behaving like sane persons, and are thus protected from the customary attack, whilst, after discharge, they fall back into their former condition through trivial causes (opposition or small quantities of alcohol). These forms may be better described as *recurrent* than as periodical forms.

It must be clearly understood that I intend to speak here only of mania and periodical or recurrent melancholia. Periodical insanity being an artificial type of disease, the term is destined to disappear from the nomenclature. Many distinct morbid forms return at more or less regular intervals through constitutional and other individual peculiarities, yet do not on that account lose their clinical character. The accentuation of the hysterical character—extending even to attacks of true insanity—coincident with menstruation, is a form of periodical insanity, just as epileptic insanity may be periodical. Attacks of dipsomania are often periodical, and similar to the periodical or recurrent attacks of hallucinatory mental confusion. All these morbid forms cannot be grouped, either through their genesis or their nosographical characters, with periodical mania or periodical melancholia. The periodic return of any psychosis whatsoever has its origin in the temperament of the individual, and occurs in the most diverse forms of insanity.

CHAPTER XV

MANIACAL-DEPRESSIVE INSANITY

THE typical form of maniacal-depressive insanity consists in an attack divided into two periods, the one plainly maniacal, the other as plainly melancholic.

It may begin, indifferently, with mania or melancholia ; it may exhibit the most diverse degrees of intensity ; it lasts from some weeks to two years and longer.

If the disease has commenced with the melancholic form, the symptoms disappear after a stationary period. The state of inhibition diminishes ; the field of ideas is gradually enlarged ; the dawn of the former activity reappears ; the deliria, if there were any, lose their colour ; the mind is less oppressed and more hopeful ; by degrees sleep, appetite, and former habits return, and thus little by little a state very similar to the normal is reached. Yet, when the patient seems restored to former conditions, the scene, in the course of a few days or weeks, changes. The one-time sufferer from melancholia appears more hilarious than usual, more loquacious, more meddlesome, more enterprising, no longer deliberate, sometimes audacious, sarcastic, irritable, intolerant, aggressive. Thus develops the maniacal attack, which assumes all the previously described characters and grades of mania, and it may last as long as the melancholic attack, sometimes much longer.

Unlike the purely circular form, this may be followed by a period of mental decadence, especially when the maniacal attack is long and intense. In other cases recovery proceeds slowly, and is either complete or attended by some little deficit. In these typical cases no further attack occurs for many years.

In some cases the inversion of the morbid type takes place only after a very long interval of time. After a long period of perfect sanity a patient in my private clinique was, in 1891, seized with a maniacal attack which lasted about nine months ; a lypemaniacal attack occurred in 1900. Both attacks reached the middle grade of intensity, both had the same duration.

One might be led to suppose that these attacks, separated by such long intervals of mental sanity, might be connected with one



FIG. 83.—PERIODICAL MANIA.

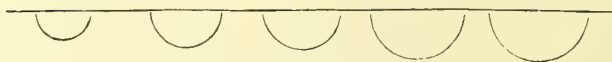


FIG. 84.—PERIODICAL MELANCHOLIA.

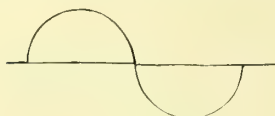


FIG. 85.

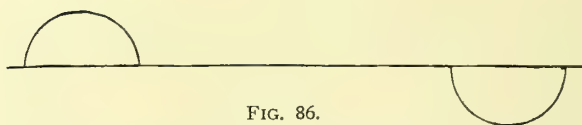


FIG. 86.

FIGS. 85 AND 86.—MANIACAL-DEPRESSIVE INSANITY.

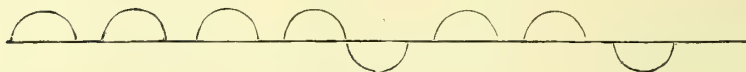


FIG. 87.

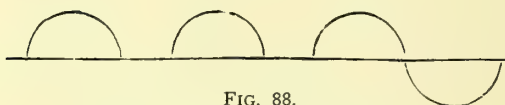


FIG. 88.

FIGS. 87 AND 88.—MIXED FORM.

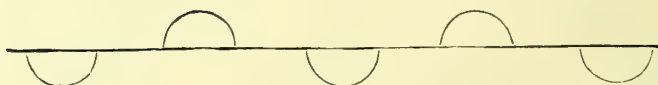


FIG. 89.

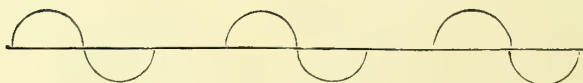


FIG. 90.

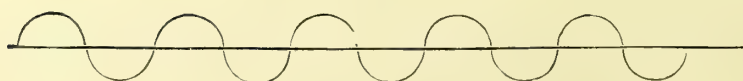


FIG. 91.

FIGS. 89, 90, AND 91.—CIRCULAR INSANITY.

another, thus constituting a single morbid form. In each attack the physical conditions change with the psychic ones. The blood-pressure, the hæmoglobin, the number of red corpuscles, the respiration, the muscular force, the sensibility, become altered, and are found in the respective attacks of circular insanity to be the same as in pure mania and pure lypemania.

In other cases two or three attacks occur at intervals of a year or so, all showing the same features—pure attacks of mania or of melancholia; and after the second or third attack there follows the exalted-depressive one, which represents a graver form than simple melancholia or relapsing mania.

The attack of exalted-depressive insanity may be continuous, or broken in two by a lucid interval, of longer or shorter duration, even lasting about a year.

In circular insanity the alternating attacks are repeated indefinitely.

The gravest form of this sub-group is that which gives very short truces, inasmuch as the psychic life is caught in the gearing of a series of maniacal and lypemaniacal attacks, from which the sufferer very rarely succeeds in freeing himself.

The forms which circular insanity may assume are various. The attacks of mania and lypemania may follow each other alternately, without any truce or free interval; the single attacks of mania and lypemania may be separated by a free interval, or there may be complete exalted-depressive attacks separated by free intervals (Ritti and others).

When the attacks are interrupted by free intervals, especially if these are not very short, intelligence may be preserved sufficiently well for a much longer time than occurs in the case of a prolonged attack of mania or melancholia.

The diagrams which I give illustrate very clearly the different forms of periodical insanity and of exalted-depressive insanity in all the varieties which correspond to circular insanity.

We have nothing to add to the pathology of this form except that it is rooted in grave psychopathic heredity and in anomalies of the character.

The prognosis is grave. Mental enfeeblement follows much more slowly than in the pure form.

CHAPTER XVI

SENSORY INSANITY

UNDER this name are included all those psychopathic states which begin with hallucinations and illusions, no matter whether these sensory disturbances dominate the scene during the whole course of the disease or disappear at the beginning of it, leaving syndromes which it would be a mistake to consider as particular forms of disease, since, in point of fact, they form with the sensory disturbances one single whole, clinically and psychologically inseparable. The elevation of these syndromes to pathological dignity was only possible in so far as the connecting-links between the various psychopathic facts, and also that logical succession of symptoms a knowledge of which is important in pathological psychology, escaped our notice.

We have had described to us *amentia*, acute dementia, dementia *præcox*, *katatonia*, stupor, and mental confusion, and these in most instances are only syndromes, particular attitudes of the disease, not the disease in its entirety; they represent, also, a changeable phase, a chronological feature of a complex psychosis. Now, these syndromes which represent a part of the morbid picture cannot rise to the dignity of psychopathic figures by themselves. They must be framed in the picture which includes them all. The disease must be examined from the beginning; and just as in a great number of cases a melancholic phase often precedes the commencement of mania, thus justifying the inclusion of many manias and melancholias in the one disease called by Kraepelin *maniacal-depressive psychosis*, so in the same way those syndromes ought to be included in one description—for this reason, that the disease commences with the same phenomena, and it is only in its later development that it presents that great variety of attitudes which imprint on it a particular differential character in the successive phases.

This character might justifiably give its name to the disease if one could consider it as disjoined from the facts which precede it; but, if the various characters represent one inseparable whole, then any description whatsoever of syndromes appears to be artificial, and does violence to the logic of the facts.

What do we learn when we have had an opportunity of observing all these morbid forms at their very commencement, or when we go back over the history of the disease and reconstruct it after a strict and searching investigation? *The almost constant fact is the hallucinatory explosion of the disease.* It presents different characters in succession, assuming other forms which, whether dementia or katatonia, are more sensible and persistent, and we lose sight of the hallucinations, which in the fully-developed disease pass into the second rank, and no longer dominate the morbid picture, or else are regarded as accidental, but not necessary, phenomena in a disease already developed; and hence we speak of dementia and katatonia as diseases in themselves, but we are no more justified in doing so than we would be entitled to speak of hemiplegia as a disease without taking into account the destructive focus which produces it, or to raise to nosological dignity malarial anæmia without having regard to the infection which produced it, and to the connection which exists between the different facts of the disease.

Neglect of the mode of development of these complex symptoms has been the cause of great confusion—a confusion tending to make itself felt more and more every day, and greatly hindering that intelligent knowledge of things which arises from keen observation, free from that subjectivism which, having an air of originality, disconcerts the regular progress of scientific thought.

Kinaesthetic, tactile, auditory, and visual hallucinations have a great disintegrating power over the personality. The latter possesses an index of resistance differing enormously in various subjects, and when it is decomposed, the fragments either remain isolated or become grouped together again, giving rise to other compositions which become grafted upon the nature of the patient, like the paranoidal formations, katatonic manifestations, etc.

In the classification I have separated mental confusion from sensory insanity because in some cases of the former, in retracing the history of the disease, I have not succeeded in satisfying myself as to the hallucinatory beginning, and on that account I do not deny that some neurasthenic states may proceed the length of giving a confusional syndrome or so-called simple dementia præcox without hallucinations, or with late sensory disturbances.

Whilst in a great number of mental diseases hallucinations are secondary, although very important, phenomena in sensory insanity, on the contrary, they are the radical and substantial phenomena, and consequently they provoke abnormal intellectual and affective states.

Clinical observation, on which this conception of sensory insanity is founded, extended to particular morbid forms considered till now as diseases *per se* (acute dementia, dementia præcox, mental confusion, etc.), though preserving the particular

clinical dignity of the psychosis compels us to distinguish it into several sub-groups.

The first is constituted by what I would call illusional or perceptive insanity. It consists in an illusory perception of one's own physical person, or that of others. Illusory perception, whilst it furnishes material for a false judgment, disintegrates the personality, taking it almost by surprise.

As a rule, it occurs in neuropathic individuals, or in persons whose brains have become vulnerable owing to heredity or excesses, and in whom even a slight sensory disorder is sufficient to disturb the whole psychic union.

The following are a few examples of it :

OBSERVATION XXIII.—M. M., a nurse, about twenty-four years old, had always enjoyed good health, and was bringing up with great care a child of Prince X. in Palermo.

One day she was told that a brother, whom she had not seen for a long time, had come to visit her. Anxious to meet him again, she went out into a hall adjoining the room, but stood dismayed on beholding her brother, not in his true stature, but shorter in height by a good many inches.

The illusion persisted. The young woman, not being able to calm herself, put a great many questions to her brother as to the reason for such a change in his height, but it was impossible to convince her that there was no truth in what she asserted. That day she remained in a state of inhibition, was depressed, dubious, stupefied. This state became more pronounced, phenomena of disintegration appeared on the scene, and even went the length of real mental confusion, on account of which she had to be sent to the asylum. She recovered after a month or so.

OBSERVATION XXIV.—A neurastheniac one day looked in the mirror, but no longer recognised his own physiognomy, so much changed did it appear to be. From that moment there was established a state of anguish with psychic arrest, and after a few days, during which he was depressed, preoccupied, and full of anxiety, he came to tell me his case. That false image supplied the germ of a depressive delirium which lasted a few months. He got better, and I have not seen him since.

OBSERVATION XXV.—A. N., a girl in her sixteenth year, belonging to a neuropathic family, delicate, rather good-looking, a little proud of her beauty, slender, and very excitable, was one day looking at herself in the mirror, when she noticed that her mouth was turned to one side, that her nose had become longer, and that her ears were not on the same level. Alarmed, she turned her eyes from the glass, but for confirmation of what she had seen she decided to re-examine herself in the glass, and having done so came away with the same impression, became melancholic, irritable, gloomy, indolent, and remained for hours before the mirror choked with sobs. She was sent to the country, where she recovered after energetic tonic treatment.

Such cases as these are not rare. They cannot be confused with any of the known psychopathies. They cannot be mistaken for confusion, because this phenomenon is either entirely wanting or is secondary and late ; nor for melancholia, because the painful

state of mind is relatively insignificant, and the afflictive coercion of the intellect is determined by a false perception, which is the primary fact, and takes the consciousness by surprise in the fulness of its vigour ; nor for paranoia, because here we do not observe delirium, but a simple orientation, with preoccupying concentration on that which has been falsely perceived. It is not a simple hallucinatory episode of a neuropathic constitution, for in all these cases we have to deal with a true symptomatic complexity whose first appearance is clearly definable.

In every case I have observed the neuropathic constitution and neurasthenic phenomena. Recovery is not the most frequent result.

In the second sub-group are included subjects of hallucination of good mental constitution, in whom the hallucinations, being neither intense nor terrifying, but varied, may be repeated for a very long time without disturbing their mental organization and conscious personality.

Here is an example of it, and such as is not commonly met with :

OBSERVATION XXVI.—The case is that of a very intelligent and cultured gentleman who for a few years has been tormented by hallucinations which we may call reflex, auditory, and visual. All the words and other sounds which he hears, especially if loud, such as the cries of street hawkers, are repeated many times in succession like an echo, and then disappear.

In consequence the course of his thought and his speech, often broken in upon by this repetition and confused blending of calls, words, and sounds, is rendered very difficult, and the actual perception of what surrounds him is equally difficult on account of the obstacle which comes into the field of perception from the preceding perceptions, whose survival he recognises to be nothing but the echoes of what he really hears and sees. From time to time in the evening and the silence of the night these echoes are repeated more feebly ; but he knows that they are only the repetition of the diurnal phenomena, and pays no heed to them, but struggles continually in order to keep himself fully conscious, and to keep a firm grasp of his ideas and convictions. Now and then, however, he suffers so much from them as to have true states of anguish and excitement, from which he recovers after a few weeks, returning to the previous state. Twice he has suffered real attacks of acute confusion with marked logorrhœa and incoherency, along with excitement, restlessness, and insomnia, from which also he recovered in little more than a month, returning gradually to what he was before—always troubled by the usual echoes.

That he preserves his psychic personality entire or almost entire, except for a certain tendency to the interpretation of the phenomenon, is clearly demonstrated by the following letter which I received from him :

‘SIGNOR PROFESSOR,

‘Serious afflictions caused my disease, afflictions which in themselves were perhaps incapable of causing such serious injury in others, but in me, endowed by Nature with an exquisitely sensitive heart, with a tenaciously reflective intelligence, and a fervid imagination, however

well balanced, were sufficient to give rise to serious disturbances, which still persist, though in a less degree.

'The disease manifested itself in 1888, and the first phenomenon observed by me was sudden tension, or rather an instantaneous attack of cramp in the principal muscle of the brain, producing, as it were, the effect of a bowstring violently snapped, and I distinguished even the noise of it, so much so that I took my head between my hands, not knowing what had happened to me; I foresaw, however, that it was something very serious.

'From that day forth, without my being conscious of it, fancy, no longer governed by the will and directed by the intelligence, hastened always on to the formation of phantasmagorias, which I believed positive realities. I wanted to read, but the phantasmagorias, stronger than my will, insidiously and persistently undermined my attention, attracting it towards themselves, and I remained abstracted for whole hours without attending to what I was reading.

'In proportion as the unconscious predominated over the conscious *ego*, the echoes continued to develop in all my members—eyes, legs, arms, hands, and more especially in my ears—without my being able to explain why. As I saw all my movements repeated in others, I ran hither and thither seeking to hide myself in the innermost recesses of the house, believing that all were set against me: but I perceived afterwards that they were my own echoes, revealing to me things which had no existence.

'I had already experienced great mental worry, and now to the worry was added fancy. Even in my waking moments I dreamt of courts of justice and courts of assize. I became so much absorbed in these phantasmagorias alone that for entire days my wayward fancy, with all the vividness of reality, led me through the harrowing experience of the criminal dock, the judgment, the condemnation. Then my room became transformed into a cell; the acrid smell of the prison disinfectants was in my nostrils, and when I dined it was the taste of convicts' food I felt in my mouth, and that even although the table before me was exquisitely set. Day and night were the same to me in this respect.

'At the end of June, 1891, all these phenomena were reproduced in an exasperating manner, and in August they broke out again to such an extent that I entirely lost all feeling. During this period the images were likewise very vivid. In the long sleepless nights I seemed to see the trusted members of the family who were taking charge of me changed into thieves who wished to rob me, and I rose to the writing-desk, got the keys, and handed them over, asking only that my life should be spared. They were quite dismayed, not knowing what I meant. On another occasion I saw their figures lengthen, then introduce themselves through the keyhole in the room where I was, whilst I could distinguish all their features; a struggle then took place between myself and them. One night I had enacted before me the scene of an indescribable outrage committed by a man upon a woman. The latter seemed to be in bed in my room, whilst the man was two doors distant. I perceived the odour and even noticed the colour of his sperm as it passed before my nose in the dim light, and I tired myself out in trying to prevent such a great sin, diverting the sperm with my hand.

'As I have said before, however, the most striking and disturbing phenomenon, because of the consequences it had for me, was that of the echoes. These reflected all that I thought, all that I heard, all that was repeated around me, whether at hand or at a distance, just within reach of my hearing, which was morbidly acute and sensitive. Once they were formed, it was not in my power to restrain or regulate them; they had to be exactly repeated, and I was entirely passive. The striking

fact was that the insistent repetitions were always in direct ratio to the impression which they produced in my mind.

'I ascertained with perfect certainty that I heard noises of every kind, but especially the voices of others, who, assuming my voice, made known to others my echoes, which were repeated without my knowledge; and if two were speaking near me their voices struck on my tympanum as the reproductions of my voice, hence the ill-regulated thoughts that were aroused in my mind.

'The baneful effect of the echoes varies also according to the voices that give rise to them. It is least if the voice which provokes them is harmonious and pleasantly modulated; it is more marked if the voice is loud and more or less harsh; it is very marked if the voice is discordant, loud, and sonorous; it is even greater if it is sonorous and cadenced; it is really terrible if it is cadenced and vibrating.

'After my previous experience of such echoes I fought against them in the beginning of the second stage of the disease, and restrained them as much as I was able; but when I was unsuccessful, as was most usually the case, I used to mix up, interpose, and transpose names and things, thus rendering them as little intelligible as possible, and after great efforts I began to obtain a moderate result.'

After a long harangue upon the effects of hypnotism, he thus concludes: 'The phenomena are always the same, but always more governable, less insistent, less remarkable. What will be the principal phases? How long will they last? The future will reveal.'

He is afflicted by visual as well as by auditory hallucinations. He is present at a continual succession of confused scenes, like phantasmagorias—plants, objects, men, places, etc.—which are a true torment to him although he is conscious they are due to errors of the senses.

Sometimes he is seen to move his lips very slightly, as if he were speaking in an undertone with someone, and often he stops the discourse abruptly, resuming it if called upon by his interlocutor. This phenomenon gives ground for believing that the echoes of which we have spoken are complicated by motor verbal hallucinations.

Here is another case like the preceding, affording a slight indication as to the mode of development of deliria:

OBSERVATION XXVII.—C. Italia, thirty-nine years of age, was admitted into the clinique on December 15, 1903. Her mother was hysterical. Patient was married against her will to a man whom she did not like; she lived some years with her husband in little else than the worst possible manner, without harmony of minds and interests having been established, and when, six or seven years ago, she made up her mind to return to her mother's house, she brought back no other remembrances of her married life than those of the carnal brutality of her husband, and of the great disgust that his embraces produced in her. Ultimately she gave herself up to spiritualism, in regard to which she read many books, and carried out many experiments. For a certain time she firmly believed in the existence of spirits, which answered to her invocations, obeyed her commands, peopled with spectres the room where she passed days and sleepless nights, and tormented her ears, near to which they passed, with their shrieking and hissing. Now, however, she has changed her opinion. 'All our visions,' she affirms, 'are the products of our thoughts; they are even products that our thought repels. When I see a person,' says the patient, who is fairly well cultured, 'I impress his image on my mind, and am able to reproduce it clearly at will.'

After giving subtle explanation of the hallucinatory facts, she writes in regard to thought:

'Human thought does everything. All the worlds which occupy space are only the condensation of human thought, and so many images which, issuing from the brain of many men, blend together and condense, forming worlds. Thought, which manifests itself outwardly in all its forms, from the most elementary and simple to the highest and most complex, is not something evanescent, ethereal, impalpable; it has, instead, an essence which can make itself tangible by condensation, an essence which can be materialized to the point of forming the stars; all the more admissible is it that it may create spirits.'

'Sometimes I have felt, and feel often yet, as if a gust of wind were passing close to me and shrieking in my ear: "I am a thought launched by someone into space."'

Given this materialization of human thought, and the tangible forms that it assumes outside of us, she is no longer astonished by the fact that her thought may be read by all, and that it may be repeated outside of her as soon as it is outlined in her brain. The most fleeting, the least meditated of her thoughts, at the very moment of its formation, becomes repeated in her ear by other persons whom she does not know. They are not words which she feels in her brain, in her cranium; she hears them pronounced in her ear, and they come from without: she cannot be mistaken as to that—the perception is precise. Succession of the two phenomena—formation of the thought in her mind and the repetition in her ear—is wanting. Such is their simultaneity that she is almost irritated that others outside of her should find instantaneously the verbal form of her thought before she finds it herself. It is a phenomenon that used to madden her before she became aware of the explanation of it. Sometimes, simultaneously with the hearing of the word in her ear, she observes a certain movement in her tongue, as if it were putting itself into position for pronouncing the same word.

She often feels also sharp prickings on the hairy and other parts of her body, but by preference on the head: they are the thoughts of others, which sometimes reach her with violent rapidity, and in penetrating to her brain they cause her pain. Once she had the impression that an entire head had entered her own, tearing the cerebral coverings. It was not a false impression: her head, her old head, was substituted at that moment by a new head. On another occasion she felt as if a strong wind had penetrated the vulva and gone out by her mouth, passing through her and almost tearing in pieces the abdominal and thoracic viscera. It was certainly a thought, a strong thought, of unknown origin, which crossed and shook her organism. The phenomenon was not repeated.

The patient has also formed her opinion as to the capacity of human thought to clothe itself in an outward form, creating spirits and worlds, and whether all human beings possess this capacity equally, or whether there are privileged beings who enjoy it or suffer from it in larger measure. She believes that while it is a possession common to all men, being even potent in all, it is in a certain way more developed, more actual, in women who do not bear children.

In this sufferer the fact has to be noticed that while she feels herself unhappy and uneasy in every situation, she does not at the actual moment blame any living being for her misadventures. Her brother, mother, and husband are responsible mediums in the sense that by certain acts which she imputes to them they have produced such modifications in her organism that her life has been developed differently from that of others. Now, however, she is a victim to cosmic forces, from the dominion of which no one can release her. Probably her brother, mother, and husband did not know the tragic consequences of apparently simple acts.

Another point in her history, which we gathered from conversation with her, and which we have not had an opportunity of confirming, is that in the period when she gave herself up to spiritualism she had longer or shorter phases of complete unconsciousness of which she has no remembrance (duplication of the personality ?).

In this case we cannot speak of paranoia. If, nevertheless, there is some slight paranoic manifestation, the whole scheme of the disease is formed by the action of the hallucinations to which the sufferer, who is intelligent and cultivated, gives an interpretation, the elements for which she draws from her spiritual culture. Her personality, meanwhile, is neither altered in a paranoic sense nor disintegrated.

There is, then, one form of sensory insanity which does not produce remarkable changes of the psychic personality, neither confusion, melancholia, nor deliria, and which is maintained for a period of time of greater or less length, save for brief episodes of one of these phenomena. Moreover, it is a form which cannot be confused with any other of the sub-groups of sensory insanity that we are going to describe.

We come now to the third sub-group of sensory insanity, in regard to which a rich literature exists, since it includes also mental confusion, on which, especially during these later years, very interesting works have been published ; but notwithstanding these, it cannot yet be asserted that the subject is exhausted.

I refer to that form of sensory insanity which is manifested by acute or sub-acute phenomena, or which develops insidiously, and gives as a constant result confusion, stupor, or stupidity of different degree, which, once established, becomes the most important feature of the whole morbid picture. It is the so-called 'acute dementia,' which includes 'acute sensory delirium' (Schüle, Krafft-Ebing), the *Verwirrtheit* and the *Verworrenheit* of the Germans (Ziehen, Fritsch, Wille, Konrad, and others), besides the amentia of Meynert, the stupidity and mental confusion of the French (Dagonet, Chaslin), and the majority of the cases of dementia præcox of Kraepelin.

The confusing terminology of this disease depends on the very varied forms which it assumes, and on the persistency of certain symptoms which impress quite a particular physiognomy on syndromes that have been mistaken for distinct diseases. Add to that the long duration of the disease, making it difficult to lay hold of it at its very commencement. In the construction of the morbid figures the individual factor has evidently been neglected. If, in consequence of hallucinations, one personality is not disintegrated, whilst a second becomes paranoic (becomes transformed, but preserves a logical capacity in the delirious manifestations), and a third is decomposed or dissociated (confusion, amentia, acute dementia), and manifests itself under a great variety of forms, now by psychomotor excitement, then by stupor, by melancholic or joyful char-

acters (melancholic variety and maniacal variety), by catalepsy and paranoid formations, etc., still it is not to be held, because of all these varieties, that they are different diseases. They are one disease. It begins with hallucinations or illusions; these have a disintegrating power over the personality, whose attitudes, once decomposed, are most diverse, owing to intrinsic reasons and the intensity of the primary cause.

No sure distinction can be made between the acute and the chronic form of hallucinatory confusional insanity, because, if it is true that in some cases the disease runs an acute course for weeks or months, in others the acute phase is very short, and gives place to syndromes which in no way differ from the acute forms or from those which are not preceded by an acute hallucinatory phase.

To tell the truth, it is generally agreed that hallucinations are almost always present in the morbid picture; but whilst, owing to certain varieties of mental confusion, some—as, for example, Meynert, Schüle, Krafft-Ebing, Fürstner, Serbsky, Ventura, Del Greco, Lutzenberger, Noera, and many others—give to them the value of an essential symptom, especially in the case of that acute form of sensory insanity called acute sensory delirium, delirium of inanition (Brequet), acute hallucinatory paranoia (Westphal), others hold the hallucinations to be a secondary and not essential symptom of the disease. Amongst these we have to mention Fritsch, Clouston, Chaslin, Séglas, Kraepelin, and Morselli.

Several authors distinguish clearly two forms of confusion—the hallucinatory and the primary. Amongst these is Kraepelin.

Clinical observation, however, shows that acute sensory delirium, or acute hallucinatory dementia, is only a variety of sensory insanity, in which should be included many other morbid states characterized by hallucinations which, with or without an acute explosion preceding, primarily or insidiously produce mental confusion or stupidity, which very often presents, especially in the adolescent and the young, the signs of dementia præcox and its varieties—katatonia and sensory paranoia.

These three syndromes cannot be distinguished from acute mental confusion, acute dementia, or amentia; neither are they well distinguished from one another, but run into one another in such a manner that the dement of this group (dementia præcox) is sometimes katatonic and paranoid, whilst the paranoid subject almost always suffers from dementia præcox, and may present katatonic phases. All three may proceed from acute sensory delirium (*Verwirrtheit*), or may develop slowly. An interesting point in the pathology and interpretation of these syndromes is that in the majority of the cases we find preceding an acute or sub-acute hallucinatory period, or single hallucinations which disintegrate and dissociate, rapidly or gradually, the components of the psychic personality, and give rise to the more classic amentia, or to more or less strange aggregations

composed of the fragments of the personality mixed with and animated by the hallucinatory products which tend to fix and give a particular physiognomy to these new products (paranoid).

Clinical observation does not permit the distinction of acute dementia from simple confusion, because both represent forms and degrees of the same disease, and stupor, confusion, excitement, and lucidity often alternate in the same individual. A superficial review of the clinical cases would also demonstrate to any observer that the hallucinatory phase of long or short duration is followed now by stupor, now by confusion, with or without katatonia, and that the distinction maintained by several authors, and amongst the latest by Connolly Norman, has no objective foundation.

From this group are excluded primary confusion or stupidity (very rare) on the one hand, and on the other acute paranoia, which is a disease clearly distinguished from confusional hallucinatory insanity by its clinical form and the psycho-pathological mechanism of the phenomena it presents.

From a semeiological point of view, we may thoroughly agree with the opinion expressed by Schüle, Orchansky, Kirchhoff, Ziehen, that, no matter what form mental confusion may assume, there are three symptoms which are almost never wanting—viz., incoherence, hallucinations, and deliria. Careful observation, however, has shown, and the future will still more clearly reveal, that the incoherence and delirium are produced by the hallucinations, and that in its *tout ensemble* this affection should be regarded as *a disease of the sensory sphere*.

The following succinct observations will convey a better notion of the affection than any formal description :

OBSERVATION XXVIII.—Sch. C. di P., aged twenty-three, single in comfortable circumstances, well educated, Roman Catholic, was admitted to the clinique at Naples, April 20, 1901. A maternal aunt was insane. Of a mild disposition but very impressionable, she readily abandoned herself to fantastic conceptions, neglecting her household duties. Not very capable of appreciating the real value and practical aspect of things, she displayed in all her actions a certain degree of originality, and at times did strange things that called forth rebukes, which she took too much to heart.

About twenty-eight days before admission true mental disturbances were initiated with hallucinations of sight and hearing. Whilst beside her father she all at once threw her arms round his neck, and in an agony of fear pointed to a spot where she beheld a vision of her lover, at the same time calling : ‘ Hold him, hold him ! he is ripping himself open.’

She remained for some time as though terror-stricken, trembling, sometimes apparently self-absorbed, and made no response to the anxious inquiries of her father. She then regained consciousness temporarily, embraced her father, and wept. Soon new and more varied auditory and visual hallucinations appeared. Most of them were of a terrifying nature, having reference to her enemies, her lover, his assailants or murderers ; again it was threatening and mysterious voices, revolver shots, unusual noises in the house, and under her bed. These were

followed by an intense motor agitation, with confusion, logorrhœa, incoherence, impulses, and attempts to throw herself from the balcony.

These phases alternated with others of comparative calm and with dreamy states. Her speech, however, always had reference to the content of the hallucinations. In this condition she was brought to the asylum.

On admission she was in a state of stupor ; when questioned she made no reply, then all at once she exclaimed : ' Give me a blow on the forehead so that I may be done with it all.'

After admission, phases of intense agitation alternated with phases of exhaustion and of brooding. She refused and resisted all attempts to arouse her interest. She had always a dim consciousness of what was happening around her. Her perceptions of the external world were very vague, and each of them acquired a fanciful character, or became elaborated by her delirious fancy. According as one or another stimulus



FIGS. 92 AND 93.—HALLUCINATORY CONFUSIONAL INSANITY (ACUTE DEMENTIA).

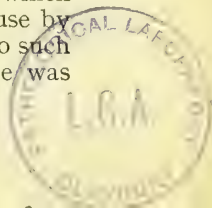
acted upon her the expression of her countenance changed from moment to moment. If anyone accosted her, if she heard any noise, if she noticed any movement whatsoever near her, she first looked round with curiosity, then turned away quite frightened with an expression of great terror. The following is a résumé of her clinical history : She hides herself under the bedclothes, is agitated, shouts out, curses, calls for help, and then perhaps suddenly smiles. Her psychic personality is broken up and disconnected ; she lives amidst a continuous whirl of false perceptions and fragmentary recollections, and particularly in a web of illusions and hallucinations usually of a terrifying nature. She often raises her head from the pillow, fixes her gaze on some particular spot, or looks under her bed, then calls out : '*Murder ! thieves ! go away ! Will you be quiet ? I know nothing ! For charity's sake kill that infamous wretch who wishes to dishonour me ! Don't you see him ? Drive him away ! Don't you hear how he knocks under my bed ?*' Then she falls back on the bed wearied, discouraged, dazed, and murmurs some words whose

meaning it is impossible to decipher, as they are always incoherent. At other times erotic images seem to run riot in her mind, and she abandons herself to them voluptuously. For example, she is heard to say : '*Come, don't run away from me ; don't stand always on the same spot !*' Very soon, however, these same images arouse in her a gradually increasing terror, and she calls out and tries as usual to free herself, to make her escape. She exhibits marked reflex excitability and hyperæsthesia in all the psycho-sensory spheres. If, while she is in a state of calm or in a drowsy condition, or, as may be interpreted from her physiognomy, indulging in dreams of pleasurable content, we make a noise or touch her, soon there presents itself the state of psycho motor agitation : she contorts herself ; her limbs and trunk become rigid, her countenance anxious, and the terrifying hallucinations are reproduced. After a little she laughs, weeps, and threatens to fall again into her wonted state of anguish. She refuses everything (negativism).

Her physiognomy is mobile and troubled : at one moment she is smiling, the next frowning ; now she is indifferent, now threatening, now listless ; her eyes are restless and at the same time without expression. She does not fix them on any person or thing except in a fleeting and distracted manner. Objects and persons pass in front of her as before one asleep. Everything she sees and fails to perceive, or perceives imperfectly, provokes immediate incoherent reactions. To one she addresses an insulting or meaningless word or phrase, mistaking that person for someone else ; another she threatens in a brazen and absurd manner, and then smiles as if she beheld some pleasant phantasm. The words she pronounces are always a fragmentary record of past images, or the half of a phrase repeated on former occasions. She touches, tears, gesticulates, and rushes about. She has been spitting continuously for several months ; this is a residual tic from a true salivation that was present in the acute period of the illness.

The following case, selected from amongst many, is very different in form, but identical in substance :

OBSERVATION XXIX.—T. L. Giuseppe, aged twenty-one, single, rustic, in humble circumstances. At his birth his mother was thirty-four, his father fifty-four years of age, the latter, even at that age, healthy and free from vice. There is no history of delinquency, drunkenness, or anything unusual in the family. The patient has always been honest, industrious, and without evil tendencies. Neither vice nor grave disease figures in his personal history. About the middle of January he had an attack of influenza. On the third night after the fever had left him, and all around was quiet, he arose in consternation, saying that he had seen the Madonna, who announced to him his imminent death. He remained trembling, his eyes gazing into space, momentarily expecting the Madonna to announce to him his last hour. This excited and emotional state continued almost unabated till the morning, and at daybreak he succeeded in escaping through the window, whence he made his way to a pastry shop. Arrived there, he demanded to know where he was and who had brought him ; finally he was taken home, but the next day, again eluding the vigilance of his friends, he shut himself up in the stable, so that it was necessary to enter by a window to secure him. Meanwhile he refused his food, did not sleep, spoke very little, and then only of the Madonna and his approaching death, and was a prey to terror. He then began to perceive that the water had a bad smell, on which account he would not drink except from a water-jug in common use by the other members of the family. His anxiety and fear increased to such an extent that the slightest noise struck terror to his heart ; he was



continually repeating such words as 'betrayed,' 'death,' 'Madonna,' and on more than one occasion made sudden attempts to injure himself with his nails. Once he tried to cut his throat with a piece of iron. In this state he was taken to the asylum.

At the objective examination several anthropological stigmata of degeneration were found.

All the elementary functions of the nervous system were normal, except for a slight inequality of the pupils.

As regards his mental condition, he exhibited terror and dismay, and this state was aggravated by the sight of his parents, and by the recollection of the vision he had had, whereupon he was seized with marked trembling and keen agitation.

Meanwhile his perceptions were sometimes normal in the sense that, apart from the preoccupations and the slowness, he was capable of perceiving and judging rationally objects, places, and persons. At other times he was confused and dreamy. Sometimes, in replying to a question, he would suddenly stop speaking, almost as though his thoughts had flown elsewhere, or as if there were a defect in the linking of one idea with another, whereupon he would remain as though stupefied, so that it was necessary to repeat the question, to which he would answer either 'yes' or 'no' as required.

Whilst in the ward, on the first two days he showed marked sensory disturbances, as at the commencement of his illness; he saw the Madonna appear again at the window facing his bed, and sometimes was on the alert for her, listening for her voice; and then his delirium would break out more violently than before, his agitation and terror become greater, since that voice reminded him of the threat of imminent death. During his periods of calm he was in a stuporous state, interrupted by fitful inconclusive acts, and not infrequently by laughter, which scarcely ever disturbs the rigid features of the melancholiac. Memory was only partially preserved; he showed considerable lapses with regard to certain periods of his illness during which he had done things of which he now retained no recollection. His associative capacity was weak, his speech incoherent, both when he spoke of his own accord—a rare occurrence—and when he replied to anything said to him. His ideative manifestations gave indications of a rudimentary form of delirium of a depressive nature, corresponding to his temperament and to the recollection of the prophecies of his death. Ideation always centred around this order of ideas, from the spell of which he was unable to free himself, and was also so slow that at times the patient assumed a stupefied aspect.

The consciousness was profoundly disturbed; disorientation was evident. One day, for example, as soon as he was brought face to face with his parents, who had come to the asylum to visit him, he was seized with agitation, trembling, præcordial distress (illusory perception), and, without taking any notice of their presence, turned to the doctor to demand from him the reading of *his document* (possibly he was referring to the sentence of death); then he requested his permission to go away, etc. Shortly afterwards, however, when he found himself left alone with his parents, he conversed with them, and greeted them affectionately.

The normal sentiments were all weakened or at least reduced; only occasionally were they momentarily reactivated, by certain impressions, to be immediately substituted by others and still others, with that same incoherence and mobility that we noted in his ideas.

We have already learned the nature of his conduct at the beginning of his illness. At home he showed violent impulses to do himself harm, with a tendency to break loose and to flee unconsciously from the house, etc.; in the ward his conduct was somewhat aimless, and betrayed no

desire except that, manifested from time to time, of going away. He often spent the day idly seated in a corner, caring little for company, avoiding conversation with his fellow-patients, and on one occasion he remained in bed for two days with his eyes fixed upon a window at which the Madonna had reappeared to him. He refused every invitation, and resisted all attempts to arouse him (negativism). He showed some impulses, some caprices, alternating with illogical refusals, in which was evident the same incoherence as we noted in the ideas and sentiments.

This patient improved by degrees. His relatives removed him from the asylum before he was yet completely recovered, but later information testified to his complete cure.

OBSERVATION XXX.—I. P., single, student in the normal school.

According to information supplied by her father, there were no antecedent nervous or mental affections on either maternal or paternal side. The patient appears to have enjoyed very good health until the week previous to admission, and she had never before given any indications of mental alienation. She was very studious, and bent on gaining her certificate as mistress. With this object in view she studied for three months night and day, scarcely sleeping two or three hours out of the twenty-four. Notwithstanding this hard work, when she presented herself for the quarterly examination, she was unsuccessful. She was greatly upset in consequence, and wept copiously. A few days afterwards she commenced to be agitated, did not recognise the members of her family, and in her delirium, as it was called by those in the house, she was continually repeating things learned at school, but in an incoherent manner.

She was admitted to the ward in this state on January 13, 1893.

On January 14 and 15 she showed marked agitation with vivid hallucinations. There was a continual flight of ideas and words bearing no connection with one another, or often merely that of assonance. Her face was pale, her eyes bright; she tossed about continually, so that it was necessary to restrain her movements. Her attitude and physiognomy changed every moment; most frequently they were significant of anguish and terror, but she often seemed to hear voices and to see persons, at one moment conversing amiably with them, the next railing against them, or beseeching them, etc. She made no replies to questions, and to stronger stimuli she reacted in a fleeting manner; now and again she exhibited verbigeration, and fell into a semi-stuporous state, only to recommence later her former behaviour. She refused all food except milk; for two nights her insomnia was not successfully combated by the hypnotics administered. On the third day a state of calm began to manifest itself, and with it her consciousness became partially clear; she remembered some things which had happened to her during the preceding days, and was to a certain extent conscious of her condition; she recognised that she was in an asylum, and said: 'It is undoubtedly the strange actions, the cries, and senseless words of the other patients that has given me the idea that this is an asylum. I have been brought here without good reason, for I am no imbecile.' She expressed a desire to return home, asked for her brother, whose voice she declared she had heard repeatedly, and was surprised to hear that none of her brothers had been to the asylum to visit her.

She felt very weak, as though she had awakened from a sleep disturbed by disquieting dreams, and had no appetite. There were also great blanks in her memory; she had forgotten a great deal. Many recollections were simply fragmentary; sometimes they were a confused mixture of actual facts and hallucinatory products, although she gave a fairly

accurate account of her previous history, stating that at her examinations she desired to display the full extent of her knowledge, that this gave rise to the confusion, and she was ashamed she did not possess the requisite stock of knowledge for a successful result. She inquired with interest as to the health of her parents, and in temperament showed herself dull, melancholic, and desirous of solitude.

This phase of improvement was of short duration, and confusion became gradually more marked; her recollections became less clear and precise, the blanks in memory wider and deeper, the ideative process slower and more disconnected, the demeanour more varied. Indifference towards her family and her own interests became greater, incoherence in speech and in action more pronounced. She ate her food in a slovenly fashion, often soiled her clothing, and lost weight every day. She did nothing she was asked to do, and, in fact, often reacted with violence. She was very often detected addressing herself to a corner of the room or to the top of the window, and assuming a listening attitude (hallucinations). She gave way to more or less impulsive and meaningless actions, and her physiognomy became more blank and expressionless.

In the month of March she showed some improvement. The hallucinations became less vivid and frequent; she was capable of adapting herself to some employment in our workrooms; she commenced to take care of her personal appearance, and, although spontaneous ideation was almost nil, or merely the expression of the products of her sensory disorders, yet there was noticed a certain reawakening of attention to interrogations, to which she sometimes replied in a sufficiently coherent manner.

In July she had almost completely recovered. Hallucinations had become less frequent and less vivid, and thought at the same time stronger and more ordered. Her consciousness became gradually restored, and she retained the memory of this long period, whereof she recollected particularly the most vivid hallucinations, estimating their pathological value fairly well. No trace was left of delirious ideas. The ideative field was certainly restricted, but the power of reproducing and associating the images in a certain sphere was restored, and at the same time the affective sentiments and those of honesty, decorum, and propriety revived. For example, during her illness she went most often barefooted, her hair loose, her clothes unbuttoned, her hands and face dirty, except when they had just been cleaned for her. Later on she took care of her personal appearance like any other respectable person. There remained behind a slight tinge of melancholia, of which she found the explanation in the trouble she had passed through, and in the long abandonment of her favourite studies. She was discharged recovered on July 12, 1894.

In some instances the malady runs a very short course, the acute hallucinatory phase being followed by a rapid recovery instead of chronic amentia. The following is an example :

OBSERVATION XXXI.—*Fel. Ant.*, from Casalnuovo, aged twenty-two, single, joiner, was admitted into the asylum on December 19, 1903.

Hereditary history was negative. Towards the middle of September the patient fell ill with an infective fever, which lasted two months. On recovery he returned to his work, but after a few days (about December 10) he showed general debility, slight bronchial signs, high temperature (40° C. for three days). During this period he had vivid hallucinations, was greatly agitated, and committed a number of strange actions, which ended in his removal to the asylum.

For the first four days after admission he was very excited, had hallucinations with hostile content (certain persons belonging to his district wished to heap abuses upon him, and laid traps for him in a thousand ways), and was so confused that he had not the slightest notion of the nature of his new environment. He was continually addressing imaginary persons, was unsettled, sought to escape from his bed, used abusive language, or was timorous and dejected.

After appropriate treatment by purgatives, intestinal disinfectants, hypodermic transfusions, the patient soon improved. After only two weeks he began to take notice of the place and the persons surrounding him, remembered in a confused way the events that had led to his removal to the asylum, and showed a keen desire to return to his family and to resume his work. He was discharged recovered one month from the date of admission.

In other instances, however, a single hallucination, if intense, produces an apparently melancholic condition, which gradually takes on all the features of the stupidity described by the French authors, and of acute dementia.

In the second part of this treatise (p. 211) I have reported the case of a man who, as the result of a hallucination, cut off his hand. That man remained confined in the asylum with the most pronounced form of dementia præcox.

As a rule, we have to deal with strongly predisposed individuals, in whom the hallucination acts like a severe physical or moral injury to the brain. The stupor or the acute dementia is prolonged indefinitely, without any necessary repetition of the hallucination.

Such cases might readily be multiplied, as these varieties of sensory insanity are the most frequent of all.

What strikes the observer at once in patients of this category is the constant association of the hallucinations with the mental confusion, which is more or less prompt and intense, according to the vividness and number of the hallucinations, as well as the cohesion of the constituent elements of the psychic personality of the individual patients.

The want of agreement amongst the different authorities, which has given rise to a large number of synonyms for the affection with which we are dealing, is undoubtedly due to the fact that the majority of the patients come under observation days or weeks after the initiation of the disease, just when the hallucinations have become less vivid and less frequent, and confusion reigns in their stead. The truth is that, whilst there are cases in which it is impossible to be certain of the existence of hallucinations, by far the most common cases are those in which the hallucinations initiate and furnish most of the colouring to the clinical picture, then become less frequent and more fleeting. It is only when we are in the happy position of having a large practice outside the asylum, and especially when there is an outdoor department in connection with the clinique, such as we have organized in Naples, that we are

enabled to catch the disease at its very commencement, and to follow its course until it reaches such a degree of development as calls for the removal of the patient to the asylum. We may affirm that, if not in all, at least in the majority of cases, the mental confusion has been hallucinatory—that is to say, has been preceded by a hallucinatory period of varying intensity and duration, of which the confusion and all the described forms of acute dementia, amentia, etc., should be considered as concomitant facts. At the same time, I do not deny the existence of a primary confusion not hallucinatory in origin, but this primary form is very rare in comparison with the other.

The disease sometimes commences tumultuously with a few intense hallucinations, which, as a rule, are repeated, or with multiple hallucinations, varying or uniform, which surprise the consciousness in its full vigour. Much more commonly it is preceded by prodromata—bad humour, a general indefinable out-of-sorts condition, increased excitability, loss of appetite, headache, insomnia, and extravagant conduct. Then come upon the scene kinæsthetic, tactile, auditory, visual, or, more rarely, olfactory and gustatory hallucinations, in single succession or all together. In the first case the patient assumes an attitude of suspicion—a vague fear takes hold of him, and, unable to find an explanation for his new impressions, he becomes self-concentrated, solitary, and breaks his wonted habits. As the same hallucinations are repeated, he is seized with real terror. Then commences the period of psychomotor agitation, the intensity of which varies in different cases within very wide limits, as in furor and in acute delirium.

Contemporaneously, the psychic personality is more or less broken up. The new arrivals in the consciousness open up quite a new world, obscuring and eclipsing the real in varying degree—a world, too, in which the old personality constantly finds itself at a loss. The fresh arrivals, invading and encumbering the field of the consciousness, hinder the formation of the normal products of thought and the regular flow essential for the direction of the actions. With the disaggregation of the old personality there is almost always incoherence of speech and action, which is to be regarded as the immediate externalization of the various hallucinations, as they gradually gain the control of the psychic life. To this result there contribute the relative emotive conditions which, free from any restraining influence, resolve themselves into a series of actions in which we see the same disorder, the same incoherence, and the same impulsiveness. The patients are a prey to strong motor agitation, in which in the gravest cases we perceive nothing intentional, whilst in the less serious cases series of movements which appear to be performed for some purpose are followed by others that have no relation with the preceding, and bear the stamp of automatism and of reflex action.

In this state the perceptive process cannot be realized; false judgments are formed upon everything that comes under the senses of the patient. Here we have not so much a true perception as a transitory notice, superficial and fragmentary, followed by illusory judgment, without any exertion of the faculty of reflection, which is either defective or completely wanting.

The greatest dissociation is in the realm of the ideas. The ideative capital rendered inert, the regular flow of thought hindered by the violent intrusion of the hallucinatory products, the norm of the ideative life is lost sight of, and substituted by that of such confused, disordered, and illogical sensory images as the sensory areas of the brain offer to the dormant consciousness.

With such sensory products, lacking any associative bond through the absence of any directive power whatsoever, with the anomalous associations of the hallucinatory products, with the fragmentary ideas and emotional states induced purely by the hallucinations and by the illusions (the more intense and illogical these, the more defective the control of the higher centres), we can readily understand to what degree the incoherence in speech and action may attain.

No logical connection exists between the psychic manifestations. The delirium, an expression of the hallucinatory content, is disconnected, chaotic, variable, like the sensory products by which it is maintained and the fragmentary reminiscences that the hallucinations themselves revive.

With this psychic condition there are associated, as a rule, somatic facts of no small value.

The temperature is sometimes febrile in the first days of the attacks; the pulse becomes feeble and rapid, the tongue coated, the breath often acetonc, the bowels constipated; there is anorexia and often refusal of food. This state of things lasts several days or weeks, after which there follows a second phase, wherein the dementia, which should be regarded as a concomitant of the preceding hallucinatory stage, is more evident, and persists for a longer or shorter time, during which the hallucinations and phases of psycho-motor exaltation are repeated with varying frequency.

One of the observations which I have recorded shows clearly that an acute hallucinatory state such as I have described above is not indispensable for the production of grave mental confusion or stupor. Such cases are very frequent. A single hallucination, if it be somewhat intense or repeated, may be quite sufficient to give such a result. In such a case it would appear that the hallucination transports the consciousness of the patient into the regions of the wholly unknown, where, no longer able to find its bearings, it remains suspicious, uncertain, and confused, until it finds some loophole of escape, or a path leading back to the old world with

which it is familiar, and where it can move with certainty and entire freedom.

Between the cases of acute sensory insanity which sometimes resembles true acute delirium and those in which the malady commences with a few intense hallucinations, or with fleeting hallucinations that exercise a strong suggestive power, followed, moreover, by a more or less notable degree of mental dysorientation, there are numberless gradations in which the hallucinations are many or few, and the agitation is wanting or the incoherence moderate. There are some in which the confusion is of short duration, being followed in a few days by convalescence, and later by complete restoration of the psychic personality.

The degree of confusion varies very much in different subjects, ranging from slight dysorientation to the most complete stupidity. There are patients in whom we hardly notice the lowered tone of the psychic personality. The psychic processes are somewhat slowed, the mnemonic reproduction difficult, the perception less prompt, and often erroneous, especially in complex positions. Such are distracted, extravagant, indifferent, irritable. Others, again, are caught in some incoherence of speech or action, sometimes illogical or impulsive, or they are heard to utter fleeting delirious ideas, survivals of the hallucinatory products. There are patients, too, who remain for a long time in a state of complete apathy and indifference, with an expression midway between astonishment and stupidity, the gaze languid and expressionless, the limbs relaxed; the head bent, the lips half open, allowing a continual flow of saliva, immobile, dirty, and oblivious to everything that goes on around them. All the psychic activities are suppressed or rudimentary. As a rule, also, the nutritive functions and the process of elimination become sluggish (D'Ormea and Maggiotto); the patients rapidly lose weight.

If one of these patients be interrogated, we either obtain no response, as though we had not spoken, or it is necessary to repeat the question several times in a loud voice, whereupon we see him slowly raise his head or slightly shrug his shoulders, or make rudimentary movements with the lips, as though desirous to reply and articulate some monosyllables; and if we persist still further, he may succeed at first in formulating a reply, but very soon falls into errors of judgment, or assumes theatrical and grotesque poses.

Between these two extreme degrees there is, as I have said, an infinite variety of others. In some the prevailing tone is melancholia rather than confusion, it also being provoked by the content of the hallucinations, and the consciousness is then comparatively lucid. The psychic arrest is marked. In others there is a prevailing spirit of happiness, and then they sing, whistle, leap, dart impulsively here, there, and everywhere, then stop either in a corner or beside a window, and gaze into space, or stand behind

a door in the strangest and most irrational attitudes. Phases of stupor often alternate with hallucinatory phases, or with numerous movements more or less irrational and impulsive. These patients sometimes assume mystic religious attitudes; at other times they remain in a state of ecstasy, with almost cataleptic rigidity of the musculature (katatonia); yet again, they exhibit on the same stuporous foundation alternations of weeping and laughter, instinctive brutish impulses, and comparative mental lucidity. Now they show stereotyped features which are residua of the previous hallucinations in a brain exhausted and prone to automatism, now negativism, now deliria with a tendency to systematization, in due accordance with the content and nature of the hallucinations with which the malady begins. All these states may follow upon or mingle with one another. In all there is evidence of the dissociation of the personality in varying degree and in all respects—ideation, affectivity, conduct, etc.

The confusion continues for a longer or shorter time, weeks or months, sometimes even years, and, according to the primary cerebral constitution, the psychic life may be restored, even when the malady has lasted for a very long time (several years).

The following are the syndromes that have received different names: acute dementia, amentia, stupidity, dementia præcox, katatonia; but they are only clinical varieties of a single morbid form—hallucinatory insanity.

As regards dementia præcox, I find no sufficient reasons for elevating it to the position of a clinical entity; it is an offshoot rather than a disease, and, whether it develops in adolescence, youth, or maturity, presents no difference in its clinical features. Confronted with a case of mental confusion, we have no means of deciding whether it will be followed by recovery or pass into terminal dementia. There is no standard to guide us, no feature presenting a loophole through which we can peer into the future. One case of profound confusion, with vivid and multiple hallucinations and with psycho-motor agitation, may end in rapid recovery, whilst another case, in which the clinical picture seems identical in its general features, may be protracted, and later on complicated by katatonia or paranoid phenomena. Sometimes we have a fortunate termination occurring very late, after several years, even when we have unquestionably had the clinical picture of dementia. Amongst other cases, I remember that of a married lady who, as a result of an acute hallucinatory psychosis, presented all the characteristics of dementia præcox—profound mental confusion, hallucinations, impulses, caprices, phases of stupid mirth and of negativism, occasional refusal of food, dreamy states, personal neglect, total loss of modesty and the sense of decency, stereotypes, and filthy habits. Throughout this condition, lasting for about five years, the husband was very anxious for me

to give a prognosis. This was a very delicate matter, inasmuch as the husband, a workman, wished to ascertain whether, for the management of his house and the care of a numerous family, all young children, he might not set up housekeeping with another woman.

I expressed my opinion as regards the future of this patient without any reserve, deeming recovery far from probable. As a matter of fact, she commenced to improve after several months. Her hallucinations disappeared; she commenced to have a true and proper conception of her environment; her ideas gradually became regulated; the associative bonds of her personality and her memory became restored; she became modest and orderly in her behaviour, and desired to see her children and her husband again. Recovery was complete in the sixth year.



FIG. 94.—SENSORY INSANITY: STUPID FORM.

Ventra (*'Le guarigioni tardive,'* etc., *Il Manicomio*, 1890) reports some very interesting cases of late recovery, amongst others being some of sensory insanity (acute dementia, amentia).

The case above referred to, like many of those recorded here, and in common with very many others that crowd all asylums for the insane, presents a perfect resemblance to the dementia præcox of adolescents. As a rule, these patients are torpid, have a vacant look, an expressionless physiognomy. They are extremely forgetful, indifferent to their dearest friends, improper in their conduct; their clothes are torn and untidy, the hair dishevelled, the lips apart, allowing the saliva to trickle from the mouth and soil the clothing, mucus is constantly running from the nose, and the patients are either voracious

or show no inclination for food. They understand nothing; they laugh or weep in a foolish manner; they are strange in behaviour, make faces, retain the saliva in their mouths, and either do not speak or utter stupid phrases. They collect everything they can lay their hands upon—paper, straw, bread, buttons, filth of all kinds, even excrement—filling their pockets with them. They are liable to phases of agitation, with cries, tendencies to tear and destroy, or to single impulses. Some show phases of excitement and of depression (circular form). The description applies equally to adolescents, youths, and adults.

Dementia præcox, as was remarked in a recent and interesting monograph by Jahrmärker, of the clinique of Tuczeck, is met with in many well-defined maladies, including even hysteria.

The peculiarities, extravagances, incoherences, the change of character, which mark the commencement of dementia præcox in youths, when not preceded by an acute hallucinatory phase, are an effect of sensory disorders which escape observation, because, unless specially inquired into, they are not brought under notice by the nurses concerned. They are vague voices that break in upon the consciousness and rupture the mental unity, heard sometimes in the body (verbal hallucinations), and leading to dysorientation. They are tactile hallucinations, profound disturbances of the kinæsthesia, that alter the central mechanism of the personality; or they are dreams whose influence is continued into the waking state, leading, in the mind already preoccupied, to a certain confusion between the real and the unreal.

Now, the inattention, the distractions, the fleeting bewilderments, the impulses, the varied and irrational attitudes, the extravagances, the eccentricities, the fleeting and paranoid manifestations, the more or less profound alterations of the character, the dulling of the intellect and affections, the neglect of personal duties, the insomnia, the isolation—in short, all those phenomena characterizing hebephrenia, which gives rise to the majority of premature dementias, have a sensory basis. Accurate inquiry into the nature and origin of those facts that already indicate the disintegration of the personality always reveals, with very rare exceptions, the existence of sensory disturbances. Here we have to deal with an increased potential of the sensory centres which, discharging itself, ruptures the relations between the mind and reality, and puts in motion the lower motor centres, now withdrawn from the influence of the inhibited controlling and regulating capacities.

Kraepelin distinguishes two forms of dementia præcox—the pure form, so to speak, without concomitant symptoms, and consisting in a progressive diminution of the mental powers, and the others in which the dementia is rapidly established, but preceded by various symptoms, such as deliria, hypochondriasis, and possibly hallucinations. I doubt the existence of the first form. Only in one or two cases have I not succeeded in elucidating the hallucinatory commencement of the malady. I cannot even agree with Christian (*Annales Méd. de Psych.*, 1899), who distinguishes first an initial, then a delirious, and finally a third period of dementia. The dementia is initiated with the confusion and the deliria. At most, the hallucinations disappear or become rare in the long run, and the deliria become less pronounced, whilst the dementia progresses.

The following is one case amongst many in which the malady was initiated not by an acute hallucinatory phase, but by sensory disorders difficult of detection :

OBSERVATION XXXII.—G. G., aged twenty-one; both parents psychopathic. Patient was subject to convulsions in infancy. He showed lively intelligence, and obtained the first prizes at school. Without any reason, he commenced to behave in a strange manner. One night he left the house, remained out all night, and in the morning said that he had been with his sweetheart. As a matter of fact, he had wandered about the streets the whole night in a dreamy state, behind the phantasm of his supposed sweetheart. He did not remain at rest in any position, but showed a marked cortical irritation, was violent, and offered resistance when being examined. From the first days he was detected gazing towards the window or a high point in the room; he laughed, gesticulated, and spoke to himself.

This is a very common mode of commencement of the dementia of youth (hebephrenia and dementia præcox), and it is clearly of hallucinatory origin. No doubt remains of such an origin when inquiry is made into most of the cases. The difficulty very often lies in the impossibility of making a full inquiry into the history of the case.

I report here the case of a patient who sought to escape from the asylum in which he was confined:

OBSERVATION XXXIII.—G., aged thirty-one, coral merchant. Mother died of tuberculosis, and belonged to a family with hereditary taint (one brother is an imbecile). He had suffered great mental worry owing to the fact that he had repaired to Senegal with coral goods, under the impression that they were not liable to import duty, with the result that the goods were confiscated and the patient sent back to his country by the Consul.

Grief and misfortune greatly disturbed his mind. Having returned home, he felt 'cannon-balls' in his spleen. Some nights he did not sleep, and felt, as it were, some miasmas produced by poisons exhaling from his body. One night he left home, and proceeded as though he were impelled towards the house of a young lady for whom he did not care much. On the road he wished to stop, but a force in his legs and trunk urged him on towards the door of that house (kinæsthetic hallucinations).

Arrived there, he saw the shadow of a doctor from his district extending wires from the balcony, and he felt those wires producing currents on his face. He returned home, and passed several days in solitude in a small outhouse, wrapped in deepest thought. One morning, whilst smoking a cigarette at the window, he perceived a peculiar odour, which was not the smell of anything burning, although on turning round he saw that his bed had caught fire, and at the same time heard a voice saying: 'Put all your clothes on the fire and lie down yourself. You will not burn.' He obeyed, put linen and other clothing on the fire, laid himself down, and fell into a sort of sleep, which was interrupted by the police, who, seeing the smoke, or previously warned by the neighbours, surprised him lying in bed, whilst a pile of linen was burning in the room, now filled with smoke. He was taken to the asylum. There he has always been gloomy, morose, and solitary in behaviour (melancholic variety of acute dementia). He is indolent, and rather fond of lying in bed. Sometimes he is detected speaking to himself; at other times a smile breaks the stereotyped, indifferent expression of his features.

One day he forced open a door communicating with a flight of steps leading to a disused cellar. Descending, he prised open a window,

removed it from its hinges, as if with the object of making his escape, but at this point stopped.

He did not run off, he did not turn back, nor did he present himself at the dinner-table; he did not call, he made no outcry, but remained there all night, and was found there, cold and famished, the following day. He confessed that he had heard a voice shouting to him: 'You will never get away from here,' and on this account he attempted to escape. His courage failed by the way, and the project was abandoned.

He is capable of formulating brief phrases, but, when left to speak for himself, he enters upon an incoherent, confused discourse, crammed with neologisms, and formed of phrases without connection and with obscure meaning, always reflecting his hallucinatory products. This is another example of dementia præcox.

We might assign a nosological dignity to dementia præcox did the malady make its appearance with the same features



FIG. 95.—SENSORY INSANITY: KATATONIC FORM.

as characterize its culmination and termination, or were these characteristics of such a nature that clinical investigation would afford an indication of their existence before they might appear with their full signification in the course of the disease, of which dementia præcox often constitutes the final issue. Most accurate inquiries, however, into the morbid manifestations of those patients whose illness has been followed for a long period have not permitted me to formulate any law of succession which will enable one to decide beforehand whether the particular form of mental confusion will end in dementia or in recovery.

Even when we have had under examination patients of the same age and of the same culture—for example, two municipal teachers—we have not been able to foresee why, under the same conditions of environment and of treatment, in the one we should have progressive restoration of the mental activities and recovery

on cessation of the hallucinations, whilst in the other we should have the confusion prolonged and accompanied by all the features of dementia præcox.

Now, if the so-called dementia præcox is not a disease, but a syndrome that is often terminal, as Kraepelin himself has often clearly stated; if it cannot be recognised by any characteristics in the morbid phases preceding it, if we except phenomena of confusion, of mental dissociation, and the hallucinations, disconnected in some, but in typical cases suggestive and determinative, I find no justification for that denomination, except in so far as it indicates a form of sensory insanity of youth which was included in the conception of hebephrenia (*vide* Seppilli, *Atti del V. Congresso della Società Fren. Ital.*, 1886). In many other cases that name corresponds to the old 'consecutive dementia.'

It is to be added that the symptoms of dementia præcox are not peculiar to it alone, but belong also to the confusional states of youth and to many other morbid states—hysteria, epilepsy, organic diseases of the brain—and also for this reason there is no evident need for a new nomenclature.

Not even on the grounds of a previous state of developmental mental weakness in an individual who becomes a subject of sensory insanity while still young, can we base an argument for the foretelling of the final issue of a malady whose chief characteristics consist in confusion along with hallucinations. The issue in a well-developed and cultured individual may be one of dementia, and in a deficient or illiterate person it may, on the contrary, be one of recovery.

The only fact which allows us to foresee a termination in irreparable dementia is the deceptive commencement of the disease, especially if complicated at an early stage by the katatonic syndrome, when the latter is not of a distinctly hysterical nature.

Were this book not a treatise for practitioners and students, a reason that prevents a long discussion of the facts and also a review of the opinions of many others, thus bringing them before the reader, I might give a fuller exposition and criticism of this question. Altogether, Kraepelin's doctrine has found ardent supporters and opponents, and has won many positions in the field of literature (*vide* Finzi, Vedrani, Mandalari, '*La dementia præcox*,' Messina, 1903; Jahrmärker, '*Zur Frage der Dementia præcox*,' Hall, 1903; P. Sérieux, *Revue de psychiatrie*, 1902; Seylus, '*Nouvelle Iconographie de la Salpêtrière*,' 1902; Serbsky, *Journal of Mental Pathology*, vol. ii., 1903; Del Greco, '*Sulle varie forme di confusione mentale*,' 1897).

Katatonia is another of the forms that sensory insanity assumes. It is merely acute dementia, amentia, or dementia præcox, with symptoms of muscular rigidity on passive movement, waxy

flexibility, cataleptiform states, hypertonicity, strong resistance to movements impressed on any part of the body. Here also we find, more or less accentuated, all the other symptoms of dementia præcox—stereotypism, negativism, but especially stupor, verbigeration, echolalia, echopraxia. Sometimes there are melancholic states, alternating with superexcitation, exaltation, stupor, and mutism (circular or maniacal-depressive form of katatonic sensory insanity). During this phase we frequently meet with refusal of food, retention or involuntary loss of urine and fæces, extravagant, theatrical, sometimes ecstatic poses, with alternations of singing, leaping, and running. Often the patients break out into impulsive actions, breaking and destroying things, performing childish actions, or assuming inquisitive and inquiring attitudes. For example, they roll about on the ground, squat down under the beds, and occupy the beds of other patients. Sometimes they exhibit convulsive attacks. Very frequently there are hallucinations, delirious manifestations of erotic, persecutory, or religious content, especially in women after parturition (puerperal insanity). There is always grave mental dissociation (confusion), and particularly stupor. The physiognomy is as expressionless as a mask, and yet there may be reason to fear impulsive, aggressive actions. In this state we may put the patient in any position we desire, and he maintains it, even though it be very inconvenient.

These are the clinical features of katatonia; they are those of acute dementia, or dementia præcox along with katatonic symptoms. As, however, katatonic symptoms are met with, not only in dementia præcox, but also in other affections, such as hysteria, melancholia, epilepsy, senile dementia, katatonia cannot be a disease in itself, but rather a symptomatic complexus. The katatonic symptom becomes engrafted on more or less profound confusion irrespective of origin, but it is more frequent in young people and in females. It is the expression of a particular idiosyncrasy.

The most classic forms of acute dementia (dementia præcox?) present katatonic symptoms in only a small proportion. In every case we have to deal with a dreamy condition resembling induced somnambulism, in which the directive power of a higher centre of the psychic life is wanting, and the consciousness is animated only by the sensory products, which represent, as it were, the dream induced in the somnambulist. Hence results the suggestivity which arises from the increased potential of the lower motor centres.

That this suggestivity is more common in, and more characteristic of, hysteria no one can deny; but the manifestation of katatonic phenomena in young people who have never been hysterical, who have never shown hysterical signs, who, on the contrary, have manifested from the very outset the marks of dementia præcox, and have not recovered, compels us to exclude the hysterical nature of katatonia in some cases. The psycho-somatic conditions

of hysteria are no doubt repeated, but on a different foundation, and with quite a different structure.

The hypothesis of Chaslin and Séglas may be considered well founded in so far as a certain number of cases of katatonia are of hysterical nature (hysterical insanity), and are quite distinct from those of purely sensory origin. Madia and Patini (*Annali di Neurologia*, 1903), in their interesting memoir on katatonia, in seven cases studied in my clinique, obtained no trace of hallucinatory phenomena. The truth is that the inquiry is very difficult, and the hallucinatory initiation sometimes escapes observation. The future alone will reveal the true succession of the phenomena, and the real nature of katatonia, which is only a modality of an affection of varying nature.

Confusion is not the only phenomenon that may follow in the wake of the primary hallucinatory phase already described. We may have another issue—namely, a systematized delirium (paranoid sensory insanity, paranoid dementia præcox). I have observed several such cases, amongst them the following :

OBSERVATION XXXIV.—P. G. belongs to a neuropathic family and is married to a working woman in poor circumstances. He has lived a rather irregular life. His illness commenced in an acute manner five or six days before admission (October, 1890) with visual hallucinations of saints, extravagant conduct, insomnia, delirious ideas of grandeur, and restlessness, succeeded in a short time by intense agitation. On the day of admission to the wards he looked dazed and frightened; he was confused, and hardly gave any response to questions put to him. After several days of hallucinatory agitation, accompanied by the confusion just mentioned, there followed a period of calm, during which he seemed to be improving. By degrees, however, he assumed a proud and haughty demeanour. He avoided entering into confidence with anyone whomsoever, and to the medical officers merely expressed his desire for liberty. If he met with any obstacle to his desires, he assumed a hostile attitude, raised his voice to a high pitch, and even used abusive language towards the staff. The confusion, which in the first days was considerable, gradually disappeared, so that the patient came to recognise clearly that he was in an asylum, and to form a fairly accurate estimate of many objects as well as persons in his new environment.

It is true that the perceptions were a little slow and the judgments superficial, a significant fact when it is considered that the patient was a municipal employé, and acted as vice-secretary. He also showed difficulty in the association of ideas, and soon became tired, so that his mental resource appeared progressively weaker the longer the conversation was sustained. In spite of this, and notwithstanding the ready exhaustibility of his perceptive power, he showed a fair mental lucidity. He had a good and accurate appreciation of all his past life, while his recollection of the period from the commencement of his illness till within a few days before he actually came under examination was fragmentary and confused. For example, he did not know precisely how long he had been in the asylum, or by whom and for what reason he had been taken there.

Apart from this, reflecting as it does the period of hallucinatory confusion, he showed a fair lucidity in other respects. In proportion, how-

ever, as his consciousness became clearer, there became apparent a new guest—a delirium of grandeur, the stable residuum of the hallucinatory products which had invaded his mind some weeks previously. He desired to obtain his liberty, because ‘as soon as he was free he would be able to acquire millions’; ‘his father was a millionaire,’ and ‘his aunt was worth a couple of millions.’ He could give no explanation of the source of these boasted riches, and merely said: ‘The revelation of that wealth and of the gold which I possess came to me in a dream.’

Thenceforward this patient has remained under our care, and to see him at present one might fancy him to be a pure and primary paranoiac, in the face of complete evolution of the delirium, with incipient mental enfeeblement. On the contrary, he is suffering from paranoia consecutive to acute sensory delirium. He has shown phases of aggravation and of comparative lucidity, besides episodes of dangerous impulses, as frequently happens amongst those who are subject to hallucinations.

Thus, for example, on December 21, 1891, whilst in a state of calm, he was seized by a sudden impulse, and without any reason rushed upon two patients, giving each a blow. On December 24 he pitched bowls and plates out of the window on the spur of the moment, calling out that women and children were below, and they did not want him to see them.

In May, 1893, he entered upon a new period of confusion consecutive to hallucinations, with very marked incoherence in speech and action, as well as in the delirious ideas. From time to time his state of calm was disturbed by very vivid hallucinations. In this phase he expressed his ideas and fell into continual contradictions in actions and in speech. On other occasions he was almost as amenable as a child.

In December, 1894, on the basis of confusion, which may be considered as a hallucinatory dementia præcox, a delirium of a grandiose nature broke out again, analogous to that shown in the first phase of the illness, except that it is now more paradoxical, more disconnected, closely resembling that of paralytic dementia, which, however, could be absolutely excluded.

We may consider the above case as one of paranoia consecutive to hallucinatory confusion, and as a more stable product of the hallucinations of the first period of the illness up till May, 1893. As recovery did not take place, the disease was continued into dementia, the ultimate issue of all psychopathies that do not end in recovery.

In another group of cases the comparatively systematized paranoid delirium is maintained by active, uniform hallucinations, consecutive to an acute hallucinatory phase.

OBSERVATION XXXV.—Lan. L. fu Antonio, of Naples, aged sixty-seven, single, admitted April 8, 1893, and readmitted October 2 of same year.

Nothing is known of her family history beyond the fact that her mother had twenty-three children, of whom she is the sole survivor. All the others died at an early age.

She appears to have always enjoyed good health until a few days before her first admission to the wards. Beyond a slightly exaggerated tendency to religious practices, on which account she was commonly called ‘The Devout,’ she has never shown signs of mental disturbance.

We have no precise information relating to the period immediately preceding the invasion of the illness. She herself says that she had some cause for dispute with a neighbour, with whom she had always been

on good terms. She commenced to call out that this person wished to poison her with a syringe full of poison, and that she had partly effected her purpose, because she already felt symptoms of poisoning. The hallucinations and the disturbances of thought accompanying them increased to such an extent that her removal to the asylum was urgently called for.

Since admission to the asylum the progress of the patient has been as follows :

At first she appeared stupid, incoherent, had no proper appreciation of her new position, and responded only in monosyllables, or at most with some stunted phrases, to the various questions put to her. Only sometimes did she assume an attitude of apparent fear, for which no definite reason could be ascertained.

After several days a moderate degree of improvement was noted in



FIG. 96.—PARANOID SENSORY INSANITY.

the psychic manifestations. The perceptions, however, were imperfect, the judgments very superficial, the credulity facile, the defects of criticism marked, reaction rather slow and difficult, as was also the manifestation of the psychic activities in general. After some time hallucinations with almost uniform content again became pronounced. Thenceforward the patient has remained in an almost stationary condition. The fundamental disturbance consists in sensory disorders and a systematized delirium. Here we have to deal almost exclusively with auditory hallucinations that have remained over from the primary acute hallucinatory phase, which, owing to the very vivid nature of the image and the feeble critical capacity of the patient, are accepted as actual facts, and completely deceive her consciousness.

Every day she is found seated near one of the beds—always the same

—in her ward, fixing all her attention on one of the large windows. Her physiognomy and attitude are those of one listening to a distant sound, and from time to time she is observed signifying agreement or the reverse with movements of her head, or she rises and turns her ear in a certain direction, as if to hear more distinctly. If she is taken away from that seat she is disconcerted, and at first seeks refuge in dissimulation, then ends by confessing that a lady of her acquaintance comes there every day to visit her. She hears her voice with the greatest distinctness coming both from the walls and from the garden, and has no doubt as to what she says. This lady seems to repeat to her: 'Why don't you leave this place? You are expected at my house,' and then proceeds to give her an account of current events and to form projects (of an amorous content) for her freedom. She does not see the said person, but the latter, she argues, must see her, because she often says: 'Why do you blush? Why are you so pale-faced to-day?' The tone of her personality when she confides her hallucinations to others changes. She puts on the air of a young coquette, rather ridiculous at her age. Notwithstanding that she is prevented from sitting near the particular bed and is removed from it every time she is caught there, she always returns whenever she can elude the vigilance of the nurses.

For some time she has no longer shown any reserve in revealing the content of her hallucinations. She now engages in conversations in a loud voice with the person who she believes comes to visit her. She rebels if anyone takes her away. A true delirium of prevailingly erotic content is organized upon the sensory disturbances mentioned. She proclaims aloud that the nurses are jealous of her *good fortune*. She believes that when she leaves the asylum she will marry a young gentleman selected for her by that same lady.

Indeed, her critical capacity is even weaker, and dementia more marked. She is always uttering the same delirious ideas in an apathetic manner, and these are becoming weaker, and sometimes entirely disappear, when the hallucinations are not repeated for some time. The latter, however, although less frequent, still present themselves in a vivid manner from time to time, and represent a still very active part of the psychic functionality. One night, for example, she took to calling out: 'Go away! Don't insult me! I don't know what you are talking about!'

In this case we have a true systematized delirium induced and maintained by hallucinations, and commencing as an acute form of sensory insanity.

Sometimes the disease commences with vague kinæsthetic hallucinations — depression, concentration, extravagances, paradoxical interpretations of internal sensations.

A true hypochondriacal delirium is set up. The patients feel a suction at the brain, the spleen being torn away, worms under the scalp and in the cranium.

If auditory hallucinations complicate the hypochondriacal delirium, which is now very pronounced, momentary manifestations of vague disconnected deliria with religious or demoniacal, or even persecutory or grandiose, content are added. In this state the patients are dangerous, owing to impulses, outbursts, tendency to suicide and to crime. Phases of excitement alternate with phases of stupor, sometimes accompanied by katatonic phenomena.

The malady proceeds in this manner for many months, and sometimes for a year or two, at one period with a prevalence of hypochondriacal deliria (hypochondriacal paranoia of some authors), at another with prevalence of the syndrome of dementia (paranoid dementia præcox), and then ideas of grandeur gradually present themselves, at first vague and fleeting, afterwards more stable and organized.

These deliria, resembling those of paralytic dementia, whilst they impress a different attitude on the patient, who up till now has been rather dull and distressed, mingle with the hypochondriacal and the persecutory deliria. Here also, according to Magnan, the evolution of systematized deliria, under another form, is sometimes evident; but meanwhile the mind becomes more impoverished, the dissociations more marked, the affective dulness greater, even the delirious ideas losing their colour, and thus there is set up an ever-increasing profound terminal dementia.

In my opinion the paranoid premature enfeeblement described by some authors (recently also by Lugaro) comprises not only the hypochondriacal variety above described, but all the others to which I have alluded, and which are best included under the title of paranoid sensory insanity.

It sometimes happens that, when the acute hallucinatory phase, the duration of which, as we know, varies greatly in different cases, has passed away, the consciousness is at first clouded, and then becomes clear; the intelligence, affected from the outset by the most evident dissociation, becomes restored: there remains, however, for a longer or shorter time a notable weakness of the will, a true hypobulia, and a marked emotivity, with corresponding impulses which present the same features as the hallucinations by which they were first determined. The given impulses are either the immediate effect of rudimentary hallucinations or of fleeting illusions, or they are to be considered as an effect of the discharge of the nerve-waves from the sensory elements, where former tensions are from time to time revived, and whence they discharge themselves directly into the cortical motor zone, without intervention of the higher co-ordinating centres. This interpretation is quite admissible when we recollect the facility with which volitional nerve-waves in weak personalities pass into automatic nerve-waves, and it is quite probable when we take into account the relations established by the disease between sensory zone and motor zone (*vide* Scheme, p. 107).

Ætiology.—Sensory insanity is the most authentic representative of the group of psychoses due to endogenous intoxication and infection. All that we have said in speaking generally of this group is applicable to sensory insanity. In support of the toxic or infective genesis, we have, in addition to all we know in a general

way, the results of direct bacteriological investigations, which in many cases have revealed the presence in the blood of various streptococci, staphylococci, and diplococci. These micro-organisms are found more especially at the commencement of the disease, disappearing later on recovery. We must not forget, however, that amongst all the origins of the intoxications the brain itself is of no small importance. Cerebral exhaustion, scanty nutrition, loss of sleep, are amongst the most frequent causes of the hebephrenic form of sensory insanity amongst students. Needless to add, the factor of predisposition always comes into play. At a meeting of the British Medical Association in 1901, Robertson declared with his unquestionable competency that the principal factors in the genesis of the acute and chronic diseases are the various forms of gastro-intestinal toxæmia, and that many mental affections, such as mania, melancholia, and dementia præcox, must be put down to this pathogenesis. In every case I have been able to obtain evidence of hereditary predisposition.

Of the infective diseases influenza is certainly the most insidious as a cause of this acute psychosis.

The *pathological anatomy*, so far as we know, differs in no way from that of mania and melancholia. In acute cases the alteration consists of chromatolysis and minute alterations of the vessel walls. There is no doubt, however, that Nissl's method is insufficient, whilst the more recent methods that reveal the neuro-fibrillar structure of the cell have not yet been employed in the various forms of acute sensory insanity. Colucci's researches deal with chronic psychoses (dementias).

Diagnosis.—The clinician can meet with no difficulty in diagnosing acute sensory insanity from mania. The cheerful tone of mind, the super-excitement of all the psychic activities, the exaltation of the real personality, the promptness and fidelity of the mnemonic reproduction, the sometimes ready judgments, the absence of true hallucinations, the prevalence of illusory interpretation, of actual stimuli, permit us in most instances to distinguish without much difficulty mania from acute sensory insanity, the prevailing features of which are the confusion and the sense of fear arising from the hallucinations, which may almost always be readily detected as a prevailing symptom of the disease.

Greater difficulty is encountered in the distinction between acute sensory insanity and the initial hallucinatory phase of progressive paralysis.

Undeniably there are cases of this last-named affection that commence with an acute hallucinatory form, and present in their later course hallucinatory phases. In this case there is no real difficulty in the diagnosis when the disease is somewhat advanced;

but when progressive paralysis commences in this manner, the clinician will only in rare instances be able to discover at the outset the true nature of the disease, more particularly when the characteristic progressive symptoms of progressive paralysis are not associated with the symptomatic complex that is mistaken for sensory insanity. The diagnosis is easy when the hallucinatory delirium occurs immediately or soon after an apoplectiform or epileptiform attack. In all other cases it is best to await the ulterior development of the disease, with its manifestation of new features, which will eliminate any diagnostic doubt whatsoever. No less difficult is the distinction between melancholia attonita and the stupor consecutive to the hallucinatory period of the disease. If we see two patients, one suffering from melancholia attonita and the other from stupor, it often happens that we cannot make out the true nature of the disease. Both are pale, both have an undecided look, both have withdrawn themselves to a corner of the day-room, both are untidy in their personal appearance, and seemingly indifferent to all that is going on around them, both refuse food; nevertheless the two diseases are essentially different. The difficulty is increased when, after some months, the melancholiac loses that attitude denoting suffering or fear, and that rigidity of the physiognomy that is peculiar to the earliest period of the disease. The contraction of the pupil in the melancholiac and the dilatation in the stuporous patient, which by some authorities have been regarded as differential signs, a certain degree of muscular rigidity in the former (hypertonia) and atony in the latter are signs of no great value, especially under the conditions I have indicated. On the other hand, we must not forget that there are cases of hallucinatory stupor in which we get muscular hypertonia and contraction of the pupil, as in melancholia attonita, even to the extent of the classic form of katatonia.

In these cases prolonged observation of the patient will furnish valuable data for the diagnosis of the disease. The sudden impulses, the stupid smile that sometimes flickers over the face, marble-like in its rigidity, of the stuporous patient, some theatrical pose, some meaningless phrase that one might vainly seek to detect in the course of melancholia, are all extremely valuable aids in the diagnosis, which will be still further facilitated by the history of the case, from which it will be made evident that the disease had an acute or insidious hallucinatory commencement, with strange, unusual conduct and incoherence.

We have already spoken of the difference between hallucinatory paranoia, which, after all, is only a sensory insanity, and the genuine primary paranoia, which is of emotive-intellectual origin, and may or may not be associated with secondary hallucinations. There is another distinction, however, between acute sensory insanity and acute paranoia, affections which, I hold, should be

clearly differentiated. Whilst in acute sensory insanity there is a tumult of hallucinations and illusions, in acute paranoia (which many authorities have confused with sensory insanity) we have, on the contrary, to deal with only a delirious and illusory interpretation of objects, persons, and actual facts, without hallucinations. In this case the disturbance is an acute non-hallucinatory primary delirium, which at most is sustained by illusions, or rather by false illusional judgments of objects and persons perceived in the usual way; motor super-excitement and loquacity are present at the same time. One patient under my care used to look at me during my visit, and perceived all the particulars of my person, yet he maintained that my features and my clothing masked the person of a priest who had taken to persecuting him, and who employed the most diabolic means to do him injury. He made similar false judgments regarding everyone, and similar illusory interpretation of all objects that came before him, including food and drink, so that he was extremely agitated and loquacious about one group of ideas, amongst which one sought in vain for a true hallucinatory product.

The history of the illness enables us to distinguish the genesis and the nature of certain hallucinatory deliria, such as those produced by intoxications, amongst the latter being especially the alcoholic and the epileptic and hysterical forms. From acute delirium we distinguish sensory insanity only by the extreme intensity of the delirium and the agitation, and by all the serious phenomena of a true acute intoxication. It is not to be forgotten, however, that in many cases acute sensory insanity is accompanied by fever, and in these the bacterioscopic examination of the blood is of the highest value, inasmuch as the presence of a bacillus, so far as our actual knowledge goes, favours acute delirium.

Prognosis.—Acute sensory insanity is a serious disease, for it sometimes jeopardizes life. The chronic form is not equally dangerous, but recovery from it is much less frequent. In my opinion the prognostic views of Fritsch and of Krafft-Ebing are too optimistic. The latter claims 70 per cent. of recoveries. I think this proportion exaggerated, whilst those of Meynert (44·5 per cent.) and of Ziehen (40 per cent.) seem to me to be more exact.

I agree with the reserve expressed by Séglas and Chaslin. Of thirty cases thoroughly studied in my clinique, twelve recovered; the others almost all ended in consecutive dementia (dementia præcox?), and one or two in systematized delirium (paranoid sensory insanity).

The percentages of deaths (8 per cent. and 6 per cent. with Meynert, 28 per cent. with Ziehen) I believe to be due in great measure to acute delirium (bacillary), which is a disease by itself,

and one which, judging from our present knowledge, should not be confounded with sensory insanity.

Treatment.—The infective nature of acute sensory insanity compels us to combat the disease with due regard to its ætiology. Here, again, however, we must remember that if micro-organisms or toxins are a cause, they exert their action only on individuals strongly predisposed by heredity.

From this point of view, the clinician meets with difficulties in the prophylaxis, which is the same as in the mental affections in general, and need not be discussed here.

Some therapeutic means are indicated in the majority of cases either of the acute psychosis or of any of the clinical varieties derived from it. These are isolation, with the object of removing the patient as far as possible from the stimuli of the external world, and careful dieting, which, on the one hand, should produce the least possible toxin, and, on the other, should make good, provided always the condition of the stomach allows it, the deficit produced by the organic consumption of these patients.

Hypodermic injections of bichloride of quinine are useful when the disease is running a febrile course. It is a good rule to eliminate the exciting action of intestinal intoxications by means of purgatives, salol, and intestinal lavage. Blood-letting in very robust individuals, or the application of leeches to the mastoid processes, have in some instances given me good results; but I have prescribed them only in the case of strong patients. Baths in the acute stage have been of little or no service. Injections of morphine hydrochloride were in most instances useful; not so, however, hyoscyamine or hyoscine or duboisine hypodermically. These are dangerous drugs, often causing unforeseen results, however cautiously employed, especially in very weak persons. Rest in bed, recommended by Neisser and Chaslin, is advantageous. The routine prescription of the bromides is sometimes useful. If morphine is not successful as a hypnotic, I prefer sulphonal or chloralamide.

In the acute stage, at the very commencement I have found nothing more useful than lavage of the tissues by means of plentiful hypodermic transfusions. After the first days of the illness this treatment in the majority of cases loses its efficacy.

Once the acute hallucinatory period is past, mild hydrotherapy by the method of Ferno or that of Dagonet, tonics such as arsenic, open air, and good nourishment, are the best therapeutic aids.

I have derived no advantageous results of any consequence from blisters on the head or neck.

One remedy not to be neglected in the treatment of stupor, when the hallucinations have ceased, is electricity in the form of galvanization of the head, with 2 to 4 milliampères, and general faradization.

The moral treatment suggested by Sauze, with the very proper restrictions indicated by Séglas, are of possible utility only in a period of decline of the illness, and especially during convalescence.

There are many grave conditions that may arise unexpectedly in the acute phase of the illness, and call for medical intervention. Amongst the chief of these is collapse, in which case ether, camphor, and quinine have enabled the physician to avert an almost imminent disaster.

CHAPTER XVII

MENTAL CONFUSION

I HAVE already expressed my opinion with regard to mental confusion. It is almost never a disease in itself; it is a secondary symptom. Most frequently it is sensory disorders that give rise to the confusion, dissociating the psychic products of high synthetic value, and breaking the logical associations of thought and action. They suppress the power of the higher centres (centres of psychic synthesis, evocative and regulative), and this gives rise to the dissociation, the incoherence, the illogical impulsions of acute dementia, or the secondary paranoid formations of low intellectual value.

Nevertheless, I do not feel warranted in absolutely denying that mental confusion may sometimes be primary, and run its course for some time at least without hallucinations. Still, this must be a somewhat rare occurrence, and even then we cannot wholly exclude the possibility of error arising from the difficult nature of the inquiry.

The disease is ushered in with all the characteristics of neurasthenia, lowering of the perceptive capacity, diminished rapidity in the formation of the psychic syntheses, slowness of the psychic processes, facile and frequent interruptions in the course of the ideas, memory neither ready nor faithful, but often illusory, a great difficulty in evoking names, confusion of things real with things dreamt of, incapacity of attention, ready exhaustion, frequent distractions, indifference, lack of stable objectives, ready changes of humour, alternations of pessimism and hilarity, great affective excitability, phases of blanks of consciousness, impulses due to the insurrection of isolated and illogical desires, strange actions, eccentricity, and sometimes fleeting delirious conceptions alternating with the consciousness of the illness and with melancholic states. Hypochondriacal features are almost never wanting.

This state may proceed in one of two directions—either it lasts for some time, with alternations of improvement and aggravation, as a grave form of neurasthenia, unaccompanied by sensory dis-

orders, and with prevailing hypochondriacal content; or the hallucinations occur later, and the malady assumes all the characteristics of acute dementia or amentia.

It is most frequent in women who have had many pregnancies and protracted lactations within a brief period, and in predisposed youths who rapidly ruin their constitutions by unrestrained onanism and school tasks.

Certain varieties of polyneuritic psychosis the development of which is characterized by dysorientation, amnesias, and more rarely by hallucinations (Korsakoff, Colella, Esposito), might be included in this chapter.

Prognosis.—The prognosis is rather favourable. The few cases I have observed of those not complicated by evident sensory disorders ended in recovery.

Therapy.—Mental repose, cessation of lactation, removal to the country, methodical muscular exercise, disinfection of the intestines with ichthyol, good nourishment, hydrotherapy, electrotherapy in the form of general faradization, and galvanization of the head, are the best therapeutic aids, and these may be advantageously combined with all those pharmaceutical products of high repute—iron, glycestero-phosphates, phosphorus, arsenic—in the most varied forms.

CHAPTER XVIII

ACUTE PARANOIA

WHILST in primary chronic paranoia the delirium or the hallucinations arise from the psychic constitution of the individual, whose defect is apparent in the exalted emotivity, in the direction of suspicion and vanity, the intellect being often weak, very rarely well developed, in acute paranoia the onset of the disease differs in no way from the mode of commencement of all the other diseases of this group in such predisposed persons as present none of the features characteristic of the first group.

In chronic paranoia the disease develops insidiously, the patient remaining in the vague borderland between sanity and insanity, and it is only after a longer or shorter time, in some instances very long, that the disease manifests itself clearly. In the acute form, on the contrary, the malady arises quite unexpectedly when the mental vigour is at its acme.

As in primary paranoia, it assumes two forms—the delirious and the hallucinatory. The latter is much the more frequent. The patient, after a period of malaise lasting several days, or during convalescence from an acute infective disease (influenza, small-pox, typhus, etc.), shows himself perturbed and preoccupied, suffers from severe headache, is irritable, suspicious, or placid and mystic in his demeanour.

Sleep is disturbed by dreams which extend their influence into the waking moments.

Hallucinations put in an appearance, and, as a rule, they are auditory and tactile. The patient hears abusive voices, threats, oaths, intimations addressed to him from the walls and ceiling, or from the public highway. He is agitated and terrified, seeks to make his escape, feels as though insects were swarming over him and worms crawling over his skin, or as though drops of cold or warm water or caustic substances were made to fall on his head. When he can no longer endure these torments, he tries to escape from them—it may be by throwing himself from the window, or by seizing a gun and firing at the ceiling of his room, whence come the tormenting voices.

Distressed, terrified, irritable, sleepless, threatening, impulsive, extremely suspicious, these patients are an imminent danger to themselves and those around them.

There are often kinæsthetic paræsthesias in the abdomen, or gustatory sensations that excite false ideas of poisoning. The food has a bad taste, and whenever they eat anything, no matter what, their abdominal sufferings are increased. Every attempt to eat furnishes fresh proof of the treachery of hidden enemies. 'They wish to get rid of him.' For this reason these paranoiacs refuse food or appease their hunger with fruit and eggs, or with something that they go out and purchase for themselves, and these they prepare with unusual caution. Cook, mother, sisters, wife, and family are all suspected alike.

Such a paranoiac, feeling himself threatened and his very existence jeopardized, becomes gloomy, irritable, intractable, threatening, and impulsive. The tongue is dry and coated, the breath often acetonic. The fasting or the scanty and unsuitable food aggravates this state of affairs. Temperature is some decimals higher than usual; nutrition rapidly fails.

Sometimes acute paranoic delirium is of mystic content. An example will prove of more service than any description.

OBSERVATION XXXVI.—A woman, whose health had been reduced by repeated parturitions and lactations and still further undermined by an attack of influenza, dreamt one night that she saw the Madonna at the foot of her bed. In the morning she awoke deeply impressed by the vision that had appeared to her in her dream, and sought to put some construction upon it. She was concentrated, abstracted, preoccupied, ate little, and was more than usually irritable. At night she had a repetition of the vision, and was awakened by the vivid impression it made upon her, but the vision remained before her even with her eyes open. The delirium now became distinctly organized: she was certainly '*the chosen of the Madonna*.' She had no further interest in her husband, her family, and her domestic duties; she appeared quite indifferent to all mundane affairs; she prepared no food, refused to occupy herself or to eat. She began to be loquacious, speaking the mystic language of the inspired person; she interpreted a number of normal impressions in an illusory manner. She always spoke logically, expressing the conviction that she was the chosen of the Madonna who appeared to her, and that she was 'destined for the glory of heaven.'

In acute non-hallucinatory paranoia, much less common, we have to deal not with hallucinations, but simply with an illusory interpretation of real things. The delirious conceptions are formed acutely, and are religious or persecutory in content. In this case the patient, excited and loquacious, recognises objects and persons, naming them properly, but giving them a signification that emanates from the nature of the delirious ideas.

In the person of the doctor he sees a messenger of God, in another person a Jesuit travestied; everything assumes a mystic or hostile

signification. Suspicion and fear of danger, nourished by preformed conceptions, become attached to almost every person of his acquaintance, near or far. Throughout the course of the disease, or a good part of it, hallucinations are absent.

The affection may last for several weeks, being rarely prolonged beyond two months, whilst the hallucinatory variety usually lasts much longer, and sometimes passes into a chronic state.

These two varieties of acute paranoia correspond to the analogous varieties of chronic paranoia (*vide ante*). The latter is characterized not only by delirium, with or without hallucinations, but also by an anomalous structure of the mind, which sometimes manifestly contains the germ of the disease. In acute paranoia, however, there may be hereditary predisposition (cerebral vulnerability), but nothing to remind us of the paranoic character. The paranoic form assumed by the mental affection is the first revelation, and is of an accidental nature.

The fact that both varieties develop in consequence of acute diseases, such as small-pox, influenza, pneumonia, typhus, etc., must lead to the conviction that they are of toxic origin.

The *therapy* does not differ from that adopted for the other acute psychoses already described as belonging to this group.

CHAPTER XIX

LATE PARANOIA

A PSYCHO-NEUROTIC form of paranoia has been clearly distinguished, particularly by Amadeo and Seppilli in Italy. Anyone with a wide practice in mental affections may observe cases confirming the distinction made by these two alienists. Cases certainly exist of men perfectly sane, intelligent, industrious, well balanced, who, as the result of intense and prolonged labour, mental worries, intestinal diseases, or other conditions that bring about exhaustion, assume a demeanour that reminds us of the developmental paranoiacs, and in the long run, when the conditions remain unimproved, develop a paranoia which differs in no way from chronic paranoia except as regards the soil of development.

As a rule, it is persecutory in form ; I have not observed any case of the expansive form. It is preceded by a longer or shorter period of suspicion, irritability, and preoccupation. The patient has a fear of becoming insane, and keeps himself apart. This state is generally associated with abdominal pains, a feeling of palpitation, severe headache, or unusual sensations in the head, sometimes with true hypochondriasis, with allegorical interpretations of the altered kinæsthetic sensations, and broken and unrefreshing sleep. After a period of such sufferings, which alter the original character of the patient, hallucinations commence, and these are generally kinæsthetic or persecutory in content.

In the first case a progressive hypochondriacal delirium is set up, with a tendency to systematization and with allegorical interpretation of a persecutory nature, leading the patient to assume a hostile attitude. Such delirium as this rarely reaches the grade or assumes the characteristics of delirium of persecution. It has been described by some authors as hypochondriacal paranoia, by others as neurasthenic paranoia, or as hypochondriacal melancholia, coinciding with the climacteric period, on which account it has been regarded as one of the insanities of the presenile period.

In the other variety of this paranoia hallucinations are not slow to present themselves. They may be auditory or olfactory,

and more especially gustatory and kinæsthetic, with a rapid and extensive development of deliria of persecution, varying in content according to the nature of the hallucinations. That of poisoning is frequent. Up to this point the malady assumes all the characteristics of chronic paranoia.

The sole difference lies in the late and occasional genesis of such a paranoia on an acquired neurasthenic basis, and in the possibility of recovery under favourable conditions for treatment ere the malady has attained its maximum development.

CHAPTER XX

NEURASTHENIC INSANITY

IN the chapter on neurasthenia I have described, as far as possible within the limits of this work, the phenomena of some neurasthenic psychopathic forms. It is superfluous to add here what we have already learned in the case of paranoia—that, as opposed to inherited neurasthenia, there exists, and is very frequent, acquired neurasthenia, which may be attributed to malnutrition of the nervous system or to endogenous or exogenous intoxications. Here we must speak more especially of the psychoses that develop on a neurasthenic basis, in so far as they present some differential characteristics permitting their recognition and distinction from the more genuine psychopathies. We know that the neurastheniac generally has a tendency to the melancholic bent of mind. He is undecided, timid, perplexed, preoccupied. He may exhibit phenomena of anguish and a fearful, sometimes obsessive, tendency to suicide; but neither the anguish nor the psychic arrest, nor even the lack of confidence, reaches the degree usually observed in melancholia. The organic sensations that attract the attention of the neurastheniac, ever altering and shifting, open the way, not only to emotive states concerning the fate of his health and the future of himself and his family, but also to true delirious formations regarding the state of his different organs and his entire organism, which he believes to be closely threatened. The neurastheniac, however, is readily distracted. He may have hours of happiness, and he seeks to drown his sorrows in some form of gaiety, in this respect differing from the melancholiac. The neurastheniac lacks that stability of the afflictive tone of mind characteristic of the melancholiac, and to the doctor and his relatives he represents in vivid colours and in a somewhat dramatic manner more than he really feels, and whilst recounting his afflictions he allows to leak out the strong hope he has of recovering, a hope which unfortunately is absent in the true melancholiac.

Whilst, however, in many cases such a state of affairs ameliorates for a longer or shorter time, either to relapse to its former state

or to maintain its advance towards recovery, it not infrequently happens that the malady becomes aggravated and slowly assumes all the features of hypochondriacal melancholia.

The differential diagnosis in these cases is possible only in the distinctly neurasthenic period, which may last for a very long time.

The psychopathic figure, then, that neurasthenia very commonly assumes is that of hypochondriacal psychosis, which may be confounded with sensory insanity and hypochondriacal paranoia. The diagnosis is important, for whilst the last-named disease offers very little hope of recovery, neurasthenic hypochondriasis is often followed by a complete cure, and sensory insanity may assume the figure of hypochondriacal acute dementia (according to others, dementia præcox). The distinction is founded on the following facts: (1) In hypochondriacal paranoia there is a prevalence of the hypochondriacal delirious ideas over the organic sensations and affective states of mind, whilst in neurasthenia it is the anomalous sensations (paræsthesias) with the relative affective states that predominate; and whilst the neurastheniac judges his sensations in his own manner, the paranoiac enters into the field of false, sometimes paradoxical, judgments—true delirious ideas with feeble affective accompaniments; (2) in the paranoiac the delirious ideas are accompanied at an early stage by hallucinations and illusions, which sometimes remain kinæsthetic in nature, but, on the other hand, are frequently accompanied by other hallucinations, gustatory and auditory, that provoke fresh delirious ideas of a persecutory content, and referring especially to poisoning, so that at bottom the paranoiac is a suspicious individual, who sometimes attributes to the malevolence of others what he thinks and judges of his own health. The neurastheniac is more concentric in his interpretation. The paranoiac tends to externalize—that is to say, to attribute to others the cause of his supposed afflictions. As regards hypochondriacal sensory insanity, we have already indicated its characteristics.

It is to be borne in mind that intermediate forms exist which can with difficulty be classified with one or other of the affections mentioned. In these cases the prognosis is much more difficult, and must be made with great reserve.

It is unnecessary in this chapter to add anything to what I have already expressed in detail with regard to fixed ideas and obsessions, which represent very frequent, and I might almost say characteristic, syndromes of neurasthenia.

There is one form of neurasthenia that passes slowly and insidiously into paralytic dementia.

In the chapter dealing with this encephalopathy I shall treat in greater detail of those varieties of this affection.

A great depression of the mental tone, a marked slowness and

dulness of the psychic processes, with tremors, inequality or fixity of the pupils, inequality and especially absence of the patellar reflex, are sure indications of progressive paralysis, even when neither the characteristic alterations of speech nor notable mental defects are present.

From hysteria we can distinguish neurasthenia only by the presence in the former of hysterical stigmata, of which I have already said sufficient in the chapter on hysterical insanity.

The prognosis is much less grave in acquired than in developmental constitutional neurasthenia.

For the therapy I refer the reader to what has been set forth in the chapter on neurasthenia.

CHAPTER XXI

CHOREIC INSANITY

CHOREA, of whatever form, is always accompanied by mental disturbances. From the anatomo-pathological point of view, we must draw a distinction between the mental disturbances accompanying common or Sydenham's chorea and those that are among the most classic manifestations of the chronic chorea of Huntingdon. In this chapter we must limit ourselves to the mental disorders accompanying ordinary chorea; the others, having a graver anatomo-pathological substratum of a progressive nature and less definite origin, should be described among the psychoses of the third group.

Since the observations of Naunyn (1888), who found a bacillus in a fatal case of chorea, those of Hitzig (1890), who discovered streptococci in two cases, and of Pianese (1893), who found a bacillus and a diplococcus in a case in De Renzi's clinique, we have had continual confirmation of the hypothesis that the ordinary form of chorea is of infective or toxic origin, and that the pathogenic agents, direct or indirect, exercise their action on the nerve-elements of the cerebral cortex, and possibly also on the lower centres.

The constant association of mental disturbances with chorea, and the prompt recovery from these, along with the disappearance of the muscular phenomena, are clear indications of the intimate relation that exists between psychic and somatic phenomena in a large number of diseases of the nervous system. The lesions are limited to those described under the term 'fever change'—that is to say, to alterations in the form of chromatolysis, now universally admitted to be toxic in nature.

In this treatise I am compelled to confine myself to the description of the psychic phenomena of ordinary chorea, without entering into all the details regarding the doctrine of the genesis and nature of the disease. The subject is very fully dealt with in all treatises of neuropathology, and it is unnecessary here to enter into details.

The choreic subject, we have said, is always mentally affected. Even at the commencement of the disease, when the choreic movements are mistaken for childish restlessness by the school-teachers and members of the family, the character is already markedly altered.

We have generally to deal with children and adolescents, much more rarely with young adults ; it is more frequent in females. They show themselves abstracted, inattentive, and indifferent. They lose their accustomed serenity and their perspicacity in perceiving and judging of what goes on around them in the family, in the school, and amongst companions. They lose their customary presence of mind and their high spirits ; they become more captious, irritable, gloomy, impulsive ; they become less courageous than usual ; they show themselves very fearful, and submit without reaction to the bullying, the jeers, and tricks of their companions. They pay no attention to their lessons, learn nothing, and only in rare instances are capable of committing tasks to memory.

This state of affairs lays them open to unjust punishments, the morbid state being mistaken for a wilful negligence of their duties, until at length the physician points out the true nature of the alteration that has taken place in the nature and aptitude of these children.

At home they display very feeble and capricious affective sentiments towards their nearest and dearest ; they appear indifferent when they do not show direct perversion of family affection, in caprices, whims, pretexts, or in exalted affectivity, and in weeping, laughter, and fear.

When the disease has reached its full development, and the muscular agitation is very pronounced, the mental disturbances are also very evident ; they rise not only from the sphere of the sentiments and of the will, but also from that of thought, which in the first stage of the disease does not seem notably affected. The perceptions are fleeting, incomplete, and interrupted ; the attention is defective, or there is entire absence of the ordinary process for judgment in accordance with the associative laws, taking into account the nature and ideative content of the various subjects.

The associative processes are often interrupted.

Every discharge of nerve-waves giving rise to illogical and indeterminate muscular contractions induces either weakening or direct suspension of the tensions in the associative paths. In this case the phrase is not completed, the judgment not expressed, a discourse cannot be logically maintained. The choreic individual loses the thread of his thought ; his speech is interrupted and jerky, reminding one of a keyboard no longer touched by the artiste who draws from it sweetly-flowing melodies, but by one who has little or no musical notions.

In addition to the continual discharge of nerve-waves into the muscular fields, diminishing the potential of various cerebral points, there is also the influence of the muscular attitudes upon the emotive state and the course of the patient's thoughts.

When the physiognomy of the choreic sufferer fleetingly assumes the muscular attitude of laughter, hatred, fear, sorrow, or anger, rudiments of the corresponding emotions pass through his mind, in

accordance with the well-known law of the associations, and the reciprocal influence of emotion upon the muscular and physiognomic attitudes. The occurrence of these rudimentary emotive states is not without its influence on the course of thought, and therefore there is not infrequent in the well-developed malady a more or less marked degree of mental confusion, and sometimes even incapacity to express any thought whatsoever. Mutism often prevails.

In the gravest forms hallucinations may arise, complicating the condition, and giving rise to disorder in the intellectual processes, as is their wont, and as we have already seen in dealing with sensory insanity. They are less frequent, however, than is held by Marcé and others; they are absent in the gravest forms of chorea. They are generally mournful spectacles (hell, battles, beasts, etc.) that succeed one another as in a kaleidoscope, giving rise to confusion and agitation.

At a more advanced stage of the disease it is no rare thing to have a true psycho-motor agitation of hallucinatory origin complicating the muscular agitation proper to the chorea.

In this case the unfortunate patient lies in bed (night and day) in a continual state of agitation of the most incoherent nature, exposing himself to the danger of bruises in every part of his body; the temperature rises above the normal, the face is congested, the eyes injected, the tongue dry and coated, the breath foul, the bowels constipated.

Diagnosis.—The diagnosis presents no difficulty; the muscular phenomena of chorea are sufficient in themselves to indicate clearly the nature of the mental disturbances.

The duration is from several weeks to three months or so. The usual termination is recovery. In no case have I seen a fatal result. When, however, the malady reaches the extreme degrees above described, with pronounced muscular and psychic agitation, we may have cause to fear collapse, or a syndrome of meningitis or encephalitis.

Therapy.—In the mild forms it is unnecessary to make any special provision for the mental disturbances accompanying chorea. It is sufficient to cure the latter.

In the acute and severe forms it is sufficient to place the patient under conditions that secure him from the possibility of blows and injuries, and to commence as soon as possible a system of treatment similar to that indicated in all the acute toxic and infective diseases, and especially abundant hypodermic transfusions, and lavage of the intestines with sterilized water or water containing ichthyol. Morphine, antipyrine, salicylate of soda, chloral, bromides, application of cold to the head, may be indicated, according to the general conditions, which must not be lost sight of in dealing with acute cases, which vary greatly in their manifestations, according to the constitution of the patient.

CHAPTER XXII

LUETIC INSANITY

A DIFFERENCE of opinion prevails with regard to the frequency, and even the genesis, of syphilitic insanity. Whilst Berkeley holds it to be comparatively frequent, at the same time he mentions how markedly he is at variance with Clouston, who, amongst 3,000 patients in the Edinburgh Asylum, found only 16 cases of syphilitic insanity.

My experience inclines me to favour Clouston's statistics rather than those of Mendel, who, in 122 cases of mania, melancholia, hypochondriasis, and other forms of insanity, found 18 coinciding with manifestations of secondary syphilis, and 10 with phenomena of tertiary syphilis.

Syphilis acts on the central nervous system in two directions : (a) through the syphilitic toxines and their indirect derivatives ; (b) through lesions of the bloodvessels and the lymphatics concerned in the nutrition of the nerve-elements. The psychoses that commence soon after the penetration of the syphilitic virus into the organism are in most instances to be attributed to the intoxication and those minute cell-changes which we suppose to occur, although we are unable to demonstrate them.

The syphilitic infection acts like all other infections and intoxications (*vide* Chapter XII.), giving rise to the most diverse forms of psychopathies, without impressing upon them any particular characteristics. Kowalewski says there is not a single psychosis that cannot be caused by syphilis. In this respect the syphilitic virus does not differ from the toxines of the diplococci or the streptococci, which give rise indifferently to melancholia, amentia, acute paranoia, etc., irrespective of the nature of the soil of development. Many of these forms differ in no way from those that arise in non-syphilitic individuals. We have generally to deal with persons predisposed by heredity, in whom syphilis is merely a determining cause, the mental affection assuming the same form in them as in the non-syphilitic (Galiano, *Revue de Psychiatrie*, vol. xi.).

Forms, however, have been described bearing special character-

istics, and developing, as a rule, at the commencement of the disease, before the secondary manifestations or during these latter. They are forms of neurasthenia, of melancholia, more rarely of mania, in which the patient's mind generally reveals a great preoccupation about the primary disease associated with his present condition. The neurasthenia is of a prevailing hypochondriacal form, in which the various manifestations of syphilis are interpreted in a manner pessimistic in the highest degree; in the melancholic form the prevailing feature is delirium of culpability and auto-accusation as well as of sinfulness, and it always has reference to the fault of having contracted the primary disease.

The maniacal forms are not pure; they are generally of a maniacal-depressive variety. The disease often commences with the melancholic phase, in which the mind of the patient is oppressed by the thought that he himself has been the cause of his disease, which, owing to its gravity, gives rise to great preoccupation, anguish, accessions of desperation, insomnia, irritability, ennui, or *tædium vitæ*.

When this state has lasted several weeks or even months, the maniacal phase breaks out almost suddenly, and is generally of a mild type (hypomania).

Hallucinatory insanity must in most instances be attributed to rather severe lesions of the cortex, and especially of the vessels. Simple syphilitic intoxication hardly ever gives rise to severe sensory insanity in any one of its forms.

It is true that Fournier has described grave forms of melancholia and stupidity associated with tertiary syphilis, and that Mickle and others have maintained that these forms of insanity do not depend on any evident lesions in the brain, although these may be found in other parts of the body. Such cases, however, must be very rare when we consider that these forms are but seldom followed by complete recovery, whilst they very often leave behind them intellectual defects (secondary dementia).

Whether epilepsy may be attributable to simple syphilitic intoxication is a matter of dispute.

If we were to believe all that is written by authorities who hold the majority of late epilepsies to be of syphilitic origin, we should have to conclude that such epilepsies depend on simple intoxication. This supposition, however, lacks proof; yet even were it demonstrated, we should have to conclude that syphilis merely raises the curtain that conceals an inherited epileptic structure.

CHAPTER XXIII

ACUTE DELIRIUM

ACUTE delirium might be regarded as an intense sensory insanity. It is a grave general affection of the cerebral cortex, with predominance of hallucinations and a rapidly increasing dissolution of the psychic personality ; it soon reaches its height, and is characterized by intense motor agitation, clouding and even abolition of consciousness, muscular contractions, true convulsive attacks, fever, tendency to collapse, and fatal issue.

The old and vexed question as to whether acute delirium is a morbid entity or a syndrome occurring as an episode in various morbid states still remains unsettled. Yet were we to consider acute delirium as an expression of grave intoxication, we should have no difficulty in conceiving that it might sometimes be an illness in itself, at other times a complication of another affection. The difficulty lies in defining the cause of acute delirium—that is to say, in deciding whether it is always a specific infection produced by a micro-organism, or if various pathogenic agents are capable of giving rise to it. The problem is not easy of solution, for the diagnosis of true acute delirium is difficult. Between acute sensory delirium (grave sensory insanity) and the acute delirium that presents convulsive phenomena at an advanced stage, there is a gradation of intermediary forms that makes the question of diagnosis extremely difficult. Fever, intense and acute psycho-motor agitation, and complete hallucinatory dysorientation, are phenomena that are observed also in less serious varieties, and terminate in recovery.

The cases referable to this last category are by no means rare and the majority of them certainly belong to grave sensory insanity.

Calmeil has already described it in a few words, which leave no doubt that the celebrated French alienist recognised its nosological dignity, as did also Fürstner, Schüle, Jensen, Mendel, Buchholtz.

Symptomatology.—It is preceded for some days by a feeling of malaise, anorexia, general prostration, severe headache, painful

sensations in the limbs, great psychic irritability, and a dazed state. Then the delirium breaks out, generally at night, with various hallucinations of terrifying content, paræsthesias, and very keen agitation.

The patient manifests an inclination to run away, utters confused words, calls out from terror, shows general agitation, and rushes about. The face is red and congested, the eyes gleaming, the muscles in constant unrest. This state of agitation, with marked movements, which from the outset is accompanied by fever, anorexia, constipation, refusal of food, and mental confusion, always hallucinatory in content, lasts only from three to six days, after which phenomena of depression appear on the scene. In this second phase of the disease the patient is less agitated, but is always very confused, even more so than in the former phase. He speaks continually, but there is no logical connection between the words and the phrases to which he gives utterance. These are all hallucinatory in content, a mere torrent of words, badly pronounced, sometimes quite inarticulate or partly articulated and pronounced in a rough and muffled voice, even to the extent of complete aphonia. From time to time he attempts to get out of bed, opens his eyes in a frightened manner, or reacts in irritation against the persons attending him, only to fall again into the state of incoherent and often incomprehensible logorrhœa, broken by episodes of rather intense agitation. No logical connection is observed in his manifestations, not even a clearly formulated delirium; the phenomenon of verbigeration is frequent, the associations arising sometimes only by alliteration. Meanwhile, the patient maintains a hostile attitude, and refuses his food; the mouth becomes parched, the lips covered with sordes, the tongue dry, the breath fœtid.

In a third phase the disease is even more aggravated. The patient lies prostrate in bed, with his eyes half closed; he speaks unceasingly in a low tone, uttering incomprehensible words, his voice being now much weaker. The pulse becomes more rapid and small, the respirations shallower and more frequent; the cornea loses its lustre, the pupils become fixed and sometimes unequal. The patient becomes pale, or else his cheeks are coloured a deep red. The nares are fuliginous, the hands tremble and perform irregular movements, and sometimes there are convulsive states, with signs of episthotonos. The skin becomes covered with perspiration, which gradually becomes clammy, and phenomena of collapse supervene, terminating in death at the end of the second or third week.

Throughout the course of the disease there is persistent fever, and the temperature in the axilla ranges from $38\frac{1}{2}^{\circ}$ C. to 40° C., sometimes even 41° C., to descend below the normal on the supervision of the phenomena of collapse. The pulse often increases to 140, the respirations to 40 and even more.

The urine is scanty, and an abundance of indican has been noticed (Regis). Albuminuria and even peptonuria is frequent (Coppin), and, according to my own experiments, as well as those of Buchholtz, the urine is toxic in a high degree.

We cannot agree with those authorities who give a less gloomy description of this disease, and, like Schüle, even admit a stuporous form, or, like Anglade in the treatise of Alberto Bullet, a maniacal variety, for both forms certainly belong to grave sensory insanity.

Pathological Anatomy.—We confine ourselves to the mention of what seems most assured. At the autopsy of a patient who has died from acute delirium we find always a marked congestion of the meninges and of the brain, infiltration of the pia, and increase of the subarachnoid fluid. The brain, which is very tense and congested, presents cortical and also subcortical hæmorrhagic points. The whole brain is darker in colour, and sometimes œdematous. On microscopic examination, in addition to marked increase of the capillary network, we find an advanced chromatolysis in the cerebral cells (Hoche, Cristiani), alteration of the cell-nucleus, and also of the cell-parenchyma, along with deformity and shrinking of many nerve-cells, disappearance or breaking of the processes, and varicose atrophy of the nerve-prolongations, noted by Cristiani with the aid of Golgi's method; increase of the neuroglial and vascular nuclei, denied by Cristiani but observed by Anglade and myself, even to the degree of neuroglial hyperplasia. We have not had a recent case permitting re-examination of the subject in question with the aid of the new methods adapted for the demonstration of the network of endocellular neuro-fibrillæ, which are the essential constituents in the complex structure of the nerve-cell. To resume, the marked hyperæmia and the rapid and intense degeneration of the nerve-elements, with vascular and neuroglial alterations, are certain proofs that what we call acute delirium is a malady quite different from all the other psychopathic forms running a long course, and must therefore depend on causes and circumstances quite apart from those connected with all the other acute psychopathies. Leaving aside the other anatomo-pathological findings, such as those of Fütterer, Snell, Holsti (an account of these may be found in my three articles on acute delirium published in the *Annali di Neurologia* in 1893, 1894, and 1899), we can certainly accord a very high value to the acute alteration of the kidneys, corresponding to the albuminuria, and confirming the notion that the clinical form described is the effect of a severe intoxication.

Etiology.—On the real nature of the intoxication hangs the keen discussion aroused by the bacteriological researches carried out in my clinique. The discovery of a particular bacillus first described

by Piccinino and myself, and confirmed by some, denied by others, has led to an unquestionably happy result, inasmuch as the majority of those who have repeated the investigations (Rasori, Ceni, Pottes, Cabitto, Alessi, Cappelletti, Kalzowski) have found either the same bacillus or something analogous, or other micro-organisms, such as the *Staphylococcus aureus*, diplococci, streptococci, etc. When we consider that the bacterial varieties met with at the outset in other acute curable forms are no longer found in the blood of the patients, once the first phase of the psychopathy is past, these results indicate that the bacteria are related in some way, directly or indirectly, with the genesis of the disease.

The problem is by no means easy of solution, but we can hold it erroneous to say that the presence of these micro-organisms is casual or due to penetration into the blood in the period preceding death. These two objections presented by Ceni and Cappelletti are overruled by the fact that, in the initial phase of the acute grave psychopathies, the bacterial finding is often positive, whilst later it is almost always negative, just as it is negative when the disease ends in recovery. It is also a fact that in acute delirium the bacillus has been found in the blood, not only in the period preceding death, but also during the second phase of the disease, several days before death.

It remains to be shown whether such micro-organisms are really pathogenic or aggravating concomitants. In the present state of our knowledge it is impossible to give a decided opinion. In our first communication we did not affirm that the particular bacillus produces the particular syndrome of acute delirium, as we have described it, distinguishing it from the other analogous forms. We wished to establish the coexistence of two facts—the gravity of the disease and the presence of the bacillus in the blood—which justify the supposition of a relation between them: either the bacillary toxins are the cause of the symptomatic complex, or the primary intoxication giving rise to the delirium alters the organic chemistry in such a way as to render possible the penetration of those micro-organisms into the blood-stream. For the reasons already explained in the chapter dealing generally with this group, I do not exclude the possibility of the existence of both a bacillary and coccal form of acute delirium, the former being perhaps the graver, the latter probably falling under the category of acute sensory delirium.

I here give a drawing of the bacillus studied by Piccinino and myself (Figs. 97 and 98).

Prognosis.—The prognosis is closely related to the diagnosis, which is always a difficult matter as regards the clinical distinction of the bacillary from the coccal delirium, except with the help of bacteriological investigation.

Fever rising above 39°C ., rapid prostration, intense confusion and incoherence, rigidity, and more especially inequality of the pupils, irregular tremors, convulsive phenomena, and dryness of the mucous membranes, all bespeak the graver form, and predict a fatal issue.

Therapy.—Since the patients are now sent to the asylum more promptly at the outset of the disease, deaths from acute delirium are less frequent than was formerly the case. In fact, although during the last two years we admitted into the asylum at Naples several patients presenting symptoms of acute delirium, in no case have we had a fatal issue. The method of treatment employed in



FIGS. 97 AND 98.—BACILLI FOUND IN THE BLOOD AND IN CULTURES.

these cases is summed up in intestinal disinfection, lavage of the tissues, and maintenance of good cardiac tone. These indications are met by milk diet and salol internally, by plentiful intestinal lavage with several litres of water, by hypodermic transfusion of artificial serum, from 500 to 1,200 grammes at a time, hypodermic injections of bichloride of quinine, with the addition, on rare occasions, of injections of morphine. On account of the violent agitation and liability to collapse in these cases, I do not employ baths, but merely resort to sponging with water containing aromatic vinegar, keeping the patient in bed. In very robust individuals, and at the outset of the disease, plentiful blood-letting has given in acute delirium, as in acute sensory delirium, rather satisfactory results.

CHAPTER XXIV

PELLAGROUS INSANITY

THIS is a disease arising from intoxication of the nervous system. It is confined to certain regions in Italy, Greece, Roumania, Russia, Bulgaria, and other countries. It is more common in Italy than elsewhere, and is there limited to Northern and Central Italy, more especially the regions of Venice, Emilia, certain frontier provinces, Umbria, Tuscany, and other districts of the valley of the Po. It is almost unknown in the South of Italy. A few cases of it have been observed there, as, for example, that described by Venturi.

Symptomatology.—Speaking generally, the disease appears in spring, but more frequently in May and the beginning of June. It is ushered in with vague general symptoms—weariness, loss of energy, heaviness of the head, and general depression. Soon there appear dryness of the fauces and mouth, intense thirst, and difficulty in swallowing. Vague pains in the limbs and back, paræsthesias, humming in the ears, and especially vertigo, give rise to a pronounced feeling of malaise. This train of symptoms very soon becomes associated with an erythema of a dark red colour on the exposed parts of the body—the face, neck, and hands—and small bullæ often appear at some points of the erythematous surface. The patient complains of itching in the erythematous parts. These soon become covered with small scales, which are continually falling off and forming again, like small powdery lamellæ, and on the neck, being limited to the exposed part, they give rise to a contrast in colour, resembling a collarette, which has been described as the pellagrous collar. Sometimes, instead of scales, crusts form. In addition to this special dermatitis, there soon occur noises in the head or in the ears, vertigo, prostration of strength, cramps, and pains in the limbs. In a short time there are added to the initial want of appetite, pains in the stomach, abdominal cramps, pyrosis (parageusia), and diarrhœa. The prostration increases, and signs of melancholia and dejection appear. In some cases there is also a troublesome and painful stomatitis, with erythematous or aphthous

characters, perverting the sense of taste, so that to the patients all things are salt or bitter, for which reason the Venetians called the malady the 'salt disease.'

The intense thirst is complicated by a feeling of insatiable hunger. In some cases the disease runs a febrile course.

The nervous phenomena dominate the scene in pellagra. We may classify the different varieties in two groups—the chronic and the acute. The former is characterized by general depression, progressive wasting, melancholia, confusion, slow dementia, paræsthesias, alterations of motility, ataxic gait, gastro-intestinal disturbances, obstinate diarrhœa, and albuminuria from nephritis. In this group contractures and subsulti are absent, although in most instances the reflexes are exaggerated.

In the acute varieties we have rapid elevation of the temperature, which may reach 39° and even 41° C.; intense neuro-muscular excitement, subsulti—spontaneous or provoked—contractures, muscular rigidity, more marked exaggeration of the tendinous reflexes, more pronounced confusion, with phases of exaltation. Sometimes this acute form of pellagra, which has also been called pellagrous typhus, develops in the chronic sufferers. Between the two groups we find numerous intermediate forms, in which we observe a great variety of psychic phenomena, and also alternations of excitement and depression. In all, however, the characteristic features are, on the one hand, the erythema, on the other the confusion and the slow mental enfeeblement. Phases of remission and also of apparent recovery are observed in the course of the disease, especially in certain seasons, a fact that very probably has some relation to the phases of life of the fungi which appear to give rise to it.

Ætiology.—The old doctrine of Lombroso, who, with his wonted acumen, noticed the genetic connection between the use of diseased maize and the development of pellagra, a doctrine confirmed by the studies of Bordoni-Uffreduzzi, Seppilli, Sormani, Monti, Pellizzi and Tirelli, Gosio, Ferrati, Antonini, and others, has quite recently found confirmation in the interesting researches of Ceni and Besta in the Phreniatric Institute of Reggio Emilia. These last two investigators undertook a systematic examination of all that had a bearing upon the genesis of pellagra, and they found that amongst the diverse fungi growing on what we call diseased maize the two most important were *Penicillium glaucum* and *Aspergillus fumigatus*. Of the former they have studied two varieties—*a* and *b*. The chronic variety of pellagra of a depressive character, and without phenomena of excitement, would coincide with the variety *a*, of *Penicillium glaucum*. With the variety *b* there would coincide the subacute forms in which, though we have the presence of psycho-motor excitement not very intense, a slight spasmodic state

of the musculature, exaggeration of the reflexes, and spastic paraparesis, as well as muscular tremors, yet there are absent true subsulti, and the tetanoid rigidity of the muscles which are characteristic of pellagrous typhus, which should be attributed to the *Aspergillus fumigatus*. Ceni and Besta reject the theory that the morbid phenomena are produced by phenol compounds, such as they produce in culture media, and they support the hypothesis that the toxic principles are due exclusively to the germ (spores and mycelia). They conclude that both the *Penicillium glaucum* and the *Aspergillus fumigatus* play a very important part in the ætiology of pellagra, and that their action can be explained only by their determining phenomena of progressive intoxication by means of the toxins they set free in the gastro-intestinal canal.

In the case of the *Aspergillus fumigatus*, Ceni's idea is that we have to deal with an infection rather than an intoxication, a fact that would also be proved by the mode of commencement and the course of pellagrous typhus, which have all the characteristics of an acute infective process, and not of an intoxication.

In any case we have to deal with a disease produced by food-stuffs (bread, cake, polento) made from diseased (mouldy) maize.

Pathological Anatomy.—In addition to the cutaneous alterations, consisting in a more or less extensive atrophy of the layers of the epidermis and the true skin with thinning and sclerosis of the skin, and those found in most of the organs, especially the intestine, the serous membranes, and the kidneys, by Vassale, and produced experimentally by Ceni, I must make special mention of the alterations of the abdominal sympathetic system (Babes and Fox), and the parenchymatous neuritis found by Dejerine. In the brain we find thickening, turbidity, and often adhesions of the meninges, atrophy and induration of the cerebral substance, increase of the subarachnoid fluid, profound alteration of the cerebral cells, and increase of the neuroglia. In the acute cases the usual cell-alterations are those found in other acute forms of psychosis. In the spinal medulla lesions are found in the various bundles (Tonnini), just as in progressive paralysis. In one case the pyramidal bundles are most affected, in another the sensory bundles, in a third the central substance. Belmondo (*Riv. Sper. di fren.*, 1889-90) found degeneration of the pyramidal bundles of various intensity. Babes and Sion found lesions closely resembling those of tabes, such as degeneration of the posterior roots and columns. These lesions are most frequent in the cervical segment. In the chronic form running a slow course the anatomo-pathological alterations are thus very similar to those of progressive paralysis and of tabes dorsalis.

Therapy.—We must concern ourselves with the prophylaxis rather than the cure of pellagra, which may be regarded as a disease

associated with poverty. It reveals, indeed, a painful state of affairs to say that in precisely those regions in Italy where the people are fairly comfortable as compared with other districts, or have become so in the last forty years, comparatively little has been done to get rid of this scourge. If the doctrines of the toxic or infective genesis of pellagra are true, as cannot be doubted, it would be quite sufficient to prevent the use of diseased maize in the regions most afflicted.

Urgent provisions are required when we consider the figures of the victims of pellagra. In the frontier districts alone the mortality from pellegra in the triennium 1887-89 reached the figure of 1,481, and in the triennium 1895-97 the figure of 1,960. In the same periods of time the pellagrous insane were respectively 1,627 and 1,138. Quite as discouraging are Agostini's statistics of pellagra in Umbria.

On the one hand, we ought to advert to the best mode of preparation and preservation of the maize, and, on the other, we should oblige people in the country to use bread made from grain instead of maize. This is a matter that should be taken up by the Government, societies of public health and improvement, and by the land proprietors. The price of maize differs greatly from that of grain, but when we think of the enormous difference between the nutritive power of the two cereals, I believe that, with a little tact, we could secure a complete victory for civilization, animated and urged on by scientific researches.

The difficulties in our way are less formidable than in the case of malaria, syphilis, and alcoholism. Pellagra is one evil which, given the seriousness of our cognitions, should disappear at no very remote time.

CHAPTER XXV

ALCOHOLIC INSANITY

THE action displayed by alcohol in the tissue metabolism, its effect thereon, and the influence it exercises on the nervous dynamism, are still to-day the subject of keen discussion.

The old doctrine which looked on alcohol, within certain limits, as a food substance—a substance of spare material, furnished with exciting power—has in these days been displaced by the teachings of Binz and of Duclaux.

The former of these observers has demonstrated the exciting power of alcohol quite apart from any reflex action and its supposed paralyzing effect on the inhibitory centres.

Further, he affirms that alcohol belongs to those stimulants which always determine wider deviations of the mind in an opposite direction.

The same observer and his followers, Heubach and Bodlander, as well as Strassmann, Atwater, Benedict, and others, have shown that 90 to 99 per cent. of alcohol taken in small doses becomes oxidized (90 per cent., according to Strassmann ; 95 per cent., according to Bodlander ; 99 per cent., according to Atwater and Benedict).

On the other hand, we know that doses of from 36 to 80 grammes of alcohol cause a fall in temperature of from 0.3° to 0.6° C. (Daub). It is not very clear whether it is to the ready oxygenation of the greater part of the alcohol, and the consequent development of vital force and heat, that we must attribute the sparing of the hydrocarbons and nitrogenous compounds from combustion, or whether this is due to the fact that alcohol interferes with the general metabolism, so that oxygenation of the tissues occurs less freely. The researches of Zuntz, Bodlander, Wolfers, Geppert, and Neumann confirm, although not in a decided manner, the hypothesis that alcohol is a reserve food when administered habitually and in small doses.

Nevertheless, there are many, amongst them Kossowicz, who hold that alcohol is a toxic substance, and that a toxic substance cannot be a food. We may admit, however, on the basis of the researches of Chauveau and the statements of Duclaux, that alcohol

is a stimulant when taken in small doses, say, of not more than a litre of wine of 7 per cent. to 8 per cent. in the twenty-four hours. Beyond this measure alcohol must be regarded as a poison which tends to destroy the nitrogenous substances in the organism, altering profoundly the tissue metabolism, the chemistry, and the activity of the nerve-element, and predisposing to, and in the long-run actually producing, insanity, or the ethic degeneration of individual and family.

No one has been able to follow the ethic degeneration produced by alcohol, even up to delirium tremens, better than Zola in the character of Couteau.

Without fear of exaggeration, and without supporting the extreme views of those who attribute the greatest part of delinquency and other social calamities to alcohol, or of those who attribute to the use and abuse of alcohol little or no influence on the human destinies, and without sharing the pessimism of Everest, for example, and the statistic criticism of Colajanni (*L'Alcoolismo, Sue conseguenze morali*, 1877), we must recognise the fact that a good part of delinquency must be put down to alcohol directly or indirectly, and that many grave psychopathic forms, especially those of the first group, originate from the abuse of alcohol by the parents (phrenasthenias, congenital criminality, epilepsy, paranoia). In this respect the meritorious contributions of Robinovitch, of Seppilli and Lui (*Statistica sulla pazzia nella provincia di Brescia*, 1899), and of Lui ('*Eredità e Alcoolismo*,' *Annali di neurologia*, anno xviii), are well worth consideration.

The index of capacity for alcohol varies greatly in different men and according to habit.

Those who are intolerant are in great part neuropathic by heredity; epileptics feel the hurtful influence of alcohol most of all.

In some, small doses of alcohol produce intoxication, whilst in others large doses are necessary.

Symptomatology of Acute Alcoholic Intoxication.—The commonest form is drunkenness.

Drunkenness presents various stages. It is generally preceded by a certain degree of psychic exaltation, with increased affective excitability, impulsiveness, aggressiveness, obscene language, or coprolalia. With the continuation of drinking, two phenomena appear on the scene—staggering, owing to the diminution of muscular tone, with all the features of the cerebellar syndrome; and mental dissociation (incapacity to preserve the logical course of thought).

At a further stage of intoxication, somnolence, sleep, and a comatose or sub-comatose state come on. From slight staggering we pass to a true ataxic condition, or a state of astasia-abasia, and finally, losing all strength, the drunken person falls wherever he is—

in the snow, in the mud, or on the open roadway. In this state there is a diminution in the arterial pressure. In the dog Binz found it lowered to 77 millimetres from the normal of 150 to 170. This explains the cyanotic aspect of drunken individuals.

The temperature is lowered. Magnan found the rectal temperature in one woman to be 26° C. Reineke, in a man, found it 24° C. Such a lowering of temperature is due to two causes—diminution of production, and greater loss of heat owing to vaso-motor paralysis of the cutaneous vessels. In this condition collapse may occur. As a rule, we have recovery from such a state.

Acute Alcoholic Insanity may assume any form—mania, melancholia, stupor, mental confusion, paranoia, hallucinatory insanity, congestive attack with coma, and other somatic syndromes.

Alcoholic mania may reach any grade. It is a common saying that alcohol soon 'loosens the tongue.' The intoxicated individual becomes happier, more self-assured, less diffident, more loquacious than usual, expansive, generous, confident, gesticulates more, and his features are more vivacious. He is more credulous and more open to suggestion when humoured, whilst he is violent, threatening, and impulsive when opposed. The somatic phenomena of mania coexist. In this, however, as in all other forms of alcoholic psychosis, there is evident weakness of the higher powers of the mind. Prudence and moderation in speech disappear; even against his own interests the drunken maniac reveals compromising affairs. It is well known that some sharpers make use of alcohol to entrap their victims; as the old adage has it, 'in vino veritas.'

In the typical and severer form (furor), the rapidity of the course of ideas, the hostility of the mind, the intolerance, the tendency to react (cortical irritability), the desire for violent destruction, the impulsiveness, the aggressive and threatening attitudes, are all more accentuated than ever, resembling somewhat the excited and sinister mind of the epileptic.

Alcoholic Melancholia, far from having the dramatic characteristics of pure melancholia, is infantile.

The melancholic drunkard is sad, easily annoyed, and irritable. He readily gives way to weeping, without being able to explain, even to himself, the reason why. Often he has hallucinations of fire, demons, and hell. He blames himself for his intemperance, his wicked conduct, the injury he has done, his sins, exaggerating them all, as in ordinary melancholia.

He has strange and painful sensations, a fear of death or torture, and a sense of impending disaster. In a childish manner, he asks pardon of his wife for the irregular life he has been leading; he gives way to despair and to sudden impulses, and during such periods he

breaks, destroys, wounds and kills, or he butts his head against the wall, or attempts other modes of suicide. Other patients present, either from the outset or after a time, vivid hallucinations with terrifying content, or kinæsthetic and tactile hallucinations which give rise to very intense fear and pronounced agitation, with deliria and suicidal tendencies.

Hallucinatory Delirium is not rare, and, as a rule, it is intense.

The hallucinations are of terrifying content, the agitation is pronounced, the confusion is profound, and is followed by a stuporous phase. Many cases of polyneuritic psychosis are of alcoholic origin.

The most frequent form is acute hallucinatory paranoia, with hallucinations of armed foes, reports of firearms, masked men (ugly and threatening), shouts, blood, strife, corpses, etc. The agitation here is more violent than in ordinary hallucinatory paranoia, and the reaction is more immediate, impulsive, and savage. The alcoholic, like the epileptic, quickly seizes the first weapon on which his eye alights, and uses it in a ferocious manner. Sometimes there are oneiric hallucinations, the images of which are prolonged into the conscious state, and possess strong determinative power. A young student X., confined in the Sales Asylum under legal warrant, had been drinking the previous evening. During the night he dreamt of foes, and called out against them. He woke, seized his revolver, and killed an unfortunate man who, having heard his shouts from a neighbouring room, had run to his aid.

Sometimes there are epileptic attacks, with brief phases of post-epileptic delirium.

Pianetta has described forms of alcoholic insanity closely resembling the epileptic equivalents, such as those described by Samt, Lombroso, Tamburini, and others. These forms are characterized by an abrupt mode of onset, rapid and violent development of the somatic picture, followed by prompt disappearance of the phenomena, with psychic reintegration and loss of memory of the delirium.

Speaking generally, the hallucinatory delirium presents no particular features apart from the more rapid course, more vivid hallucinations, and more accentuated impulsiveness; phenomena of mental deficiency, especially of the memory, are frequent. Recovery is comparatively prompt, but sometimes we have not long to wait for an issue in dementia in predisposed individuals.

When the delirium runs a chronic course, there is a prevalence of ideas of persecution and jealousy.

Jealousy pushed to the degree of paranoia, or rising to an obsessive form, often a cause of uxoricide, is due to the mental and ethic enfeeblement of the alcoholic, and to his sexual impotence (frequent in habitual alcoholists, especially when mental enfeeblement has commenced).

The chronic mental alterations produced in the long-run by the

abuse of alcohol, have reference to the sentiments and the intellect, the former suffering grave injury much sooner than the latter. The chronic alcoholic is a degraded individual both morally and socially. The sense of dignity and self-respect diminishes, and then disappears. The sentiment of duty gradually lessens; business and personal interests are neglected, work abandoned, the household, personal and family property neglected; the education of the children proceeds no further; the wife is left to herself; the husband no longer protects her or pays her attentions, and he becomes jealous of her. There is no order or method in the family and professional life.

The alcoholic is trivial, obscene, humble, and *vice versâ*, irascible, impulsive and violent, like the epileptic. He isolates himself from society, which on its part despises him. The sense of honour, decency, propriety, and the moderation of the polished and educated man are no longer evident.

His debauchery opens the way to lewdness in his home; his work is more and more neglected; he is fond of idleness, of wandering, of playing cards; he becomes instinctive, and abandons himself to the suggestion of crime. Thus, delinquency, in about half the cases, becomes the ordinary accompaniment of the abuse of alcohol. The few figures which I give sum up the whole doctrine of the influence exercised by the abuse of alcohol as one of the causes of moral decadence in the individual and in the race.

According to one statement of Bang (Norway), of 1,232 crimes, 547 (44·4 per cent.) were attributable to drunkenness.

In Russia, according to the recent statistics of Grigorieff quoted by Matti Helenius, in 3,226 crimes committed in the territory of Kasan from 1885 to 1894, 42·68 per cent. were connected with drunkenness. Of 13,687 persons who committed crimes against property in the city and province of St. Petersburg, 43·3 per cent. were alcoholists.

In France, according to the report of Guillemet, delinquency has risen where the consumption of alcohol has increased, a fact which coincides with the researches of Ferri, who found a diminution in the proportion of certain crimes in those years in which the vine crops were very bad, and with those of Marambat dealing with prisons, where, of the thieves and coiners, 1,146 in 1898 (70 per cent.) were alcoholists.

Of Germany, I can give only the statistics of Baer ('*Alcoholismus*'), who found amongst 32,837 prisoners in various establishments 41·7 per cent. of drinkers.

In England, even although we do not take into account the Parliamentary and other inquiries of the years 1834, 1850, 1872, which set down two-thirds to three-fourths of the crimes to an alcoholic origin, nevertheless the result of that of the Royal Commission of 1899, which attributes at least 50 per cent. of crimes to alcohol, must be regarded as very probable (Royal Commission on Liquor Licensing Laws, Final Report, London, 1899).

In America, the researches of Hargreaves and of Mann show that no less than 25 per cent. to 30 per cent. of the insane in asylums owe their trouble directly or indirectly to the abuse of alcohol. Further on we shall discuss the pathogenic action of alcohol in progressive paralysis, but in the meantime it is beyond question that a certain number of epilepsies are of alcoholic origin. Westphal, Tuczeck, Wartmann, Kraepelin, Féré, and lastly Robinovitch, in strong articles have sought to demonstrate the epileptogenic action of alcohol. It is true that some (Magnan, Bleuler) attribute this toxic action less to alcohol than to the extraneous substances contained in some alcoholic beverages (absinthe, fusel oil in whisky, etc.), but I do not believe that the figures dealing with the victims of alcohol can thus be reduced to any appreciable extent. In Italy, where pure wine is drunk, and where only a very small quantity of other alcoholic drinks is consumed, the psychoses and epilepsies due directly or indirectly to alcohol attain a figure which, though not so high as in some other countries, is considerable. I ought, however, to add that many individuals with hereditary nervous taint, and especially the children of epileptic drunkards, are strongly predisposed to drink. In these cases the drunkenness complicates and aggravates the predisposition.

A short time ago I was called upon to express an opinion on a grave uxoricide committed by a gentleman who certainly loved his wife, but owing to his drinking habits neglected her. Almost every day he left the house after dinner, spent his time in the taverns of the neighbourhood, and nearly every night returned home drunk. Arriving home very late one night, he asked his wife for a bottle of wine. He hurriedly gulped down the wine, and being unwilling to go to bed, went to sleep on a mattress which had been placed for him near the kitchen fire. Several hours afterwards he awoke, and, going into the bedroom, seized his wife, and drew her out of bed on to the floor, took a gun, and pointed it at her breast. The woman struggled desperately and disarmed the madman; then unloaded the gun, and went to calm the little children, terrified by the savage scene. Meanwhile, the husband reloaded the weapon, and, firing at his wife, killed her. He now remembers the particulars of the affair.

There is no doubt that in Italy, where pure grape wine is drunk, a no small percentage of psychopathies and delinquencies is due to the abuse of alcohol.

Many criminals drink before committing a crime, because the alcohol dissipates all remorse or timidity. The criminal nature finds its homogeneous medium in alcohol. Thus, the soldiers Misdea and Radici, the youth Caruson, and others, had been drinking before they committed their crimes.

Whilst acute alcoholism induces a rapid psychic disturbance, with disgregation of the personality in its higher developments,

chronic alcoholism induces a gradual lowering, even to disappearance, of the ethic sentiments in man (immorality and delinquency). No less important are the facts of intellectual enfeeblement, although appearing later.

When alcohol reaches the anatomical field of the intellect, the latter is not slow to present unmistakable signs of enfeeblement. In this case the man no longer possesses his habitual perceptive readiness, his critical acumen, and the associative facility whence is derived the imagination, which, accordingly, becomes poor and childish.

Neither fineness of phraseology nor penetration of thought is any longer an attribute of these weaklings. They no longer take the lead in conversation ; their discourses are inconclusive or trivial. The imagination is poor or utterly destroyed, the associations occur slowly and are commonplace. Poverty, slowness, inefficacy characterize the products of thought of the chronic alcoholic. There is no doubt that the attentive power always suffers greater or less diminution, but the effect of alcohol on the associations and the memory is particularly marked.

The memory suffers the severest loss. Evocation and reproduction are extremely difficult. Proper names are quite deleted from the mnemonic register ; then an increasing number of nouns disappear, and verbs and adjectives are not always appropriate. The language becomes poor, primitive, and lacks precision. The amnesia arrives at such a point in some cases that the patients cannot remember a name, even when it is repeated to them many times in succession.

As a rule, these phenomena of grave amnesia and dementia are accompanied by somatic nervous phenomena, such as tremors and coarse vibrations, which are more evident in the morning, rigidity of the pupils, exaggeration or diminution of the patellar reflexes, muscular weakness, pains, paræsthesia in the limbs and abdominal viscera, zones of anæsthesia and analgesia, sexual paræsthesia or impotence, and neuritis with muscular atrophy. This syndrome might be mistaken for progressive paralysis.

It is a strange fact, as Berkeley has noted, that these phenomena of grave chronic intoxication are more frequent and pronounced in persons who have commenced the abuse of alcohol at a late age than in those who from an early age have gradually accustomed themselves to the action of this poison.

Delirium tremens is the most classic form of alcoholic insanity. Fundamentally it resembles acute sensory delirium, with phenomena of collapse. The gastric catarrh, the scanty nutrition of those who abuse spirituous liquors, and the alterations induced by the alcohol in all the organs, but especially in the gastric mucous membrane and in the fine structure of the nerve-elements, predispose to collapse,

more especially in those who for several days have partaken of nothing but alcoholic drinks. We must, however, take into account the habituation of the nerve-centres to the stimulus of alcohol, since, when alcohol is completely withdrawn, there takes place such a lowering of the arterial tension as to give rise to a true anæmia, with inanition of the nerve-centres and phenomena of collapse, like those produced by poisoning from the introduction of a large quantity of alcohol.

The attack commences with unrest, fear, oppression, a state of anguish, and elementary hallucinations of sight and hearing. In a few hours or days delirium bursts forth, accompanied by tremors and albuminuria. It is of decidedly hallucinatory content, and visual hallucinations prevail. The hallucinations take the form of domestic animals (dogs, cats, rats) or serpents, which turn and move about continually, leap upon the bed, on the bedclothes, on the body; or of tigers, lions, elephants, which dance about and make a terrible noise around the patient. Sometimes they are phantasms of human or satanic form—horrible, threatening figures. More rarely they are birds flying about, or worms and insects swarming over the skin, and causing the delirious person infinite torments. Sometimes they are the bedclothes transformed into gold or covered with money, nude women, or erotic scenes with sexual paræsthesias. Auditory hallucinations are somewhat less frequent—reports of firearms, drums, shouts, whistling, noise of wind, rustling of trees, sound of falling water, etc. It is remarkable that the attitude of the patient varies as scene replaces scene in panoramic succession. He withdraws himself from the real world, and is now terrified and frightened. He defends himself from the attacks of animals, brushes his skin free of the insects with which he sees himself covered, seeks laughingly to catch the bird which is flying near him, gathers in his hands the golden pieces he sees on the bed, assists lasciviously in savage scenes of love, listens in ecstasy for some moments to music. With trembling hands, hollow eyes, dry lips, foetid breath, coated tongue, incapable in most instances of standing erect and articulating his words correctly, the delirious individual is like one in a dream, completely withdrawn or abstracted from reality.

He believes himself to be in another place, addresses by the names of known persons the phantasms he sees, mistakes persons present for those represented to him by his imagination. Sometimes he speaks as though he were in conversation, and often he curses his enemies, and seeks to defend himself from them, or from animals, etc. All these attitudes are logical reflexes of the hallucinations. True deliria (infidelity of his wife, death of his children, or the delirium of grandeur or persecution) are rather rare, and are noted during intervals between the hallucinations.

Further, it is not rare, in the milder forms, for the consciousness

to become partly restored during the pauses, and for the patient to be recalled to reality (remissions).

The paranoid deliria may be more persistent and better organized, but in these cases we have not infrequently to deal with deliria pre-existing in chronic alcoholists in whom the delirium tremens is a more or less fleeting episode of a chronic psychopathic condition induced by the abuse of alcohol.

The delirium tremens and the other forms of alcoholic psychosis are often found associated with other organic symptoms arising from the long-continued and hurtful action of alcohol on the organism. Apart from the morning vomiting, and the vibratory and oscillatory tremors which are more marked in the morning and more evident after an effort or on the continuation of a delicate manipulation, the delirium tremens is sometimes associated with a febrile temperature of some decimals (febrile delirium tremens of Magnan). In such cases the pulse is more frequent, weak, and compressible; the respiration more rapid and shallow. Sometimes there are cold sweats, and these are of bad augury.

The constituents of the blood present various alterations. At the height of the delirium tremens the proportion of leucocytes is increased, and according to Elzholz, there is an increase of the polynuclear cells.

Albuminuria is frequent. Fürstner found it in 40 per cent. of his cases, Naecke in 82 per cent., Liepmann in 76 per cent., Friis in 32 per cent., Krukenberg in 52 per cent. It is purely toxic, and disappears with the delirium; where it persists, it is due to nephritis.

The issue, as a rule, is recovery.

At the most, 20 per cent. of the cases are grave. A fatal issue is perhaps more frequent in countries where impure, and therefore more toxic, alcoholic substances are used.

The duration of the attack is about four days in mild cases, and from ten to twelve, or even more, in the most severe cases.

Pathological Anatomy.—In acute alcoholic delirium we find lesions in the vessels and in the nerve-elements. These present no really characteristic features. The researches of Mirzejewski, Jakimow, Vas, Dehio, Berkeley, Andriezen, and others, brought to light the usual alterations in the chromatic substance of the nerve-cell with Nissl's or a similar method, or atrophy of the dendrites and moniliform swelling of the protoplasmic processes (with the nitrate of silver staining employed by Colella). This last lesion is thought by many to be produced by the method of staining. There are no visible alterations of the fibrillar substance of the cell, or of the axis-cylinder prolongation.

The alterations found in the vessel-walls in the cortex are more marked—swelling of the nuclei of the endothelium; degenerative alterations in the cell-protoplasm; marked degeneration of the fibres

of the muscular tunic; occlusion of the perivascular and lymphatic spaces; infiltration of leucocytes, some of them swollen and necrotic; swelling and occlusion of the capillaries with white corpuscles, many of them necrosed and disintegrated. These degenerative processes are partly explained by the researches of Münk, who found that small doses of alcohol diminish the quantity of nitrogen in the urine from 6 to 7 per cent., whilst large doses increase it from 4 to 10 per cent. (destruction of albuminoid substances).

In chronic alcoholism we find great diminution in the resistive powers of the nervous tissues and of the tissues in general; from this arise the degenerations of the specific elements and the increase of the connective tissue—for example, hepatic and renal cirrhosis; atheroma of the arteries; arterio-sclerosis; pachymeningitis; ependymitis; turbidity and thickening of the pia; increase of the neuroglia; profound alterations of the nerve-cell, not limited merely to the chromatic substance, but extending to the reticulated substance of the cell and of the nucleus; various forms of degeneration—pigmentary, fatty, hyaline, etc. In some cases the number of the nerve-cells is diminished; in others the cells, and especially the pyramidal cells in the polynuritic forms, present the axonal type of degeneration (displacement of the nucleus and disintegration of the chromophilic substance). Lesions are also found in the spinal medulla and peripheral nerves. In some cases the alterations closely resemble those of senile dementia and of dementia paralytica.

Therapy.—The prophylaxis may be summed up in the diffusion of the knowledge of the dangers of alcohol. It would be necessary to prevent marriage among alcoholists, or to advocate divorce, since it is well known that a large number of alcoholists, epileptics, phrenastheniacs and criminals are the children of alcoholists. The sanitary laws should condemn the sale of alcoholic drinks containing extraneous substances which increase the toxicity of alcohol. The pure wine of the Italian vineyards is certainly less hurtful, but if in Italy delirium tremens is rare, the bad effect of wine on the products of fecundation during alcoholic intoxication of one or both parents is no less grave (*vide* chapters on phrenasthenia and epilepsy).

The therapy of delirium tremens is in no way different from that of other states of drunkenness and of other alcoholic psychoses.

In drunkenness it is beneficial to empty the stomach, and if there is cyanosis or lowering of the temperature, the only two facts that call for active medical interference, hot coffee, injections of caffeine or ether, massage of the body, hot packs, and inhalation of oxygen, are the best remedies.

In delirium tremens we must take into account the threatened danger of collapse. It is therefore necessary to keep up the patient's strength. Lavage of the stomach and the intestines will prove useful, and afterwards nourishment with milk and soda-water. If the

patient refuses food, recourse should be had to injections of peptones or to the stomach-tube.

Nux vomica and *capsicum*, along with alkalies and rhubarb, will facilitate the gastric functions. It is necessary to stimulate the functions of the liver.

Hot baths at 35° to 36° C. and hypodermic transfusions are useful if the renal secretion is scanty.

It is necessary to maintain the cardiac function at a high tone with infusions of *Adonis vernalis* or *digitalis*. The most certain sedative is morphine. Sulphonal, trional, or veronal may also be of some use. In the chronic psychopathies, in addition to hygiene and the treatment of the gastric and intestinal catarrh and constipation, bromides, iodides, and tonics are excellent remedies. Hydrotherapy and removal to the country are good and useful helps; inebriate homes aim at breaking off the drinking habit.

CHAPTER XXVI

MORPHINIC INSANITY

It is requisite to distinguish between the psychopathic condition, owing to which an individual abandons himself to the abuse of opium, and the phenomena of poisoning depending on the long-continued use of that drug or its alkaloid, morphine. In the first case we have to deal with an obsession suggested as a rule by a medical prescription—an obsession with which is manifested the neuropathic constitution. In the second case we have to deal with nervous and mental disturbances due to poisoning with the drug—disturbances which in most instances are not genuine, but complicated and mingled with the primary phenomena. In my opinion the abuse of morphine, and I might say of almost all drugs that are abused by obsession, merely puts in evidence a pre-existing anomalous character, psychopathic to a certain degree, but concealed by the controlling powers which were active to some extent before being weakened by some difficulty or embarrassment in life, or by chronic morphine intoxication itself. The latter is the expression of the modern orientation of the mind in the struggle against pain, and manifests itself in various forms, which, like the intoxications from alcohol, are due to the psychic structure and mental disposition of the individual.

I would say that in the majority of cases there is a prevalence of the hysterical character as manifested in that form of monoideism and of intellectual construction which we find in the torpid variety of hysteria where there exists a more or less marked stigma (paralysis, anæsthesia, contracture). The morphine represents, as it were, a pivot round which the whole intellectual patrimony certainly revolves, but always with morphino-centric movements, these, further, being determined by continuous organic interchanges. The fact that a lady leaves the drawing-room during conversation, and repairs to her bedroom, where she has everything ready for an injection of morphine, the seductive influence of which she is unable to resist, or goes out for a drive provided with her inseparable syringe, because at a certain hour she will be unable to support existence

without the refreshing influence of that solution bringing happiness in its train, reveals the true nature of the mind of the morphinist, and how precisely this substantial and primary anomaly may complicate and cloud the whole clinical picture of morphinism.

The great excitability of character assigned to the morphinist, and especially the mobility, the rapid passage to psychic contrasts, weeping, laughter, irascibility, dramatic poses, lewd and obscene jokes, moroseness, unreliability, reveal a state of mind pre-existing in rudiment. The alternations of exaltation and calm, the tendency to lie and slander, remind us of hysteria. Hallucinations are a distinctly morbid phenomenon. Some consider them to be frequent. In my opinion, they are very rare. In 90 per cent. of cases the morphinist is a hypochondriacal person, a fanatic with regard to his own malady. He is intolerant of pain and is egocentric, instinctive, and impotent.

Sometimes accessions of mania and melancholia, with tendencies to suicide, arise. Apart, however, from these more pronounced forms of the malady, there occur nocturnal fears and terrors. In one case I found very marked tactile hallucinations of small animals which appeared to move over and under the skin. To these features are to be added anæsthesia, hyperæsthesia, diminution of the reflexes, increased appetite, and, finally, obstinate constipation, tenesmus, dysuria, impotence, intermittent pulse, dyspnoea, dryness and hardness of the skin, furrowing of the face, marasmus, and insomnia.

Phenomena of excitement (irritability), change of temperament, incapacity for work, and demoniacal excitation, unrest, insomnia, hallucinations, intellectual weakness, etc., are observed when the use of morphine is suppressed. This agitation with hallucinations may go so far as to resemble delirium tremens.

Diagnosis.—The diagnosis of morphinic insanity is easy. The tendency to conceal abuse of morphine disappears, revealing the real state of the patient, who will now present the skin of the abdomen and of the thighs covered with punctures. Amongst other cases, I remember that of a lady sent to my clinique from Constantinople, who injected no less than 2 grammes of hydrochlorate of morphine per day, and had the skin of the abdomen and thighs raised and darkened as though tattooed. It was a repugnant sight. Again, morphine is present in the urine.

Prognosis.—As regards the prognosis, it is stated to be very grave, for perhaps no passion is so tyrannical as that of morphine; the morphinist, if not placed under treatment, goes on to marasmus and phthisis. I do not agree with this pessimism. I have been able to follow for several years the history of some individuals who injected 1 or 2 grammes of morphine per day without suffering any great injury. Residence in a well-organized and strictly disciplined hospital succeeds as a rule in curing this malady.

Therapy.—The treatment consists in the suppression of the alkaloid, but this must be neither too slow nor too abrupt. I have long been convinced that the one method involves a waste of time and the other exposes the patient to serious dangers.

The intermediate method, not exactly that of Erlenmeyer, gives the best results, and is most certain. It is necessary to have at disposal a trustworthy and competent staff, and to have great control and inflexible authority over the patient. The great secret is not to give way to the entreaties or imprecations of the patient, to substitute nothing for the morphine except quinine, iron, arsenic, massage, and electricity. The cardiac, gastric, and intestinal symptoms are cured by ordinary means, the insomnia by warm baths and electricity. In some cases hypnotism, rationally employed, as by Tanzi, will prove of service.

CHAPTER XXVII

COCAINIC INSANITY

THIS is more serious, but fortunately more rare, than morphinic insanity, and is always a complex form, showing phenomena of the inherited neuropathic constitution, on which cocainism, like morphinism, depends, phenomena of cocainic intoxication being super-added later on. I have observed a few cases, and have formed the opinion that in the mild forms cocainic insanity presents no notable differences from morphinic insanity.

In some, cocainism has been primary, in others it has been secondary to the morphinism, and generally substituted therefor by medical advice, yet it is to be regarded as a much more serious intoxication than that resulting from morphine.

The principal phenomenon by which we might distinguish cocainic from morphinic insanity, and which, according to Magnan and Soury, would be the predominating feature, would consist of cutaneous paræsthesia, accompanied by visual hallucinations of worms and insects, or by false judgments as to microbes in the skin all over the body. Hallucinations and deliria, which in certain cases are somewhat rudimentary, and need not compromise the mental structure of the patient to any marked extent, are in other instances associated with other hallucinations, and give rise to a true agitation which has a certain resemblance to delirium tremens.

The cutaneous hallucinations giving rise to judgments of worms and other small animals in the skin are not, however, characteristic of cocainic intoxication, because, independently of other observations, I have met with them typically in a case of uncomplicated insanity from morphine.

In the gravest cases there are superadded hallucinations of sight and hearing, which are of rather fearful content, and pronounced agitation, as in acute sensory insanity. In others a true hypochondriacal delirium may develop, but it rarely reaches the limits of delirium of negation.

The cocainists are often suspicious and querulous, garrulous in

conversation, and prolific in their writing (Erlenmeyer); later on they become forgetful.

The mental are often associated with somatic phenomena, such as tremors, tetaniform states (case of Chalmers, da Costa), epileptiform attacks, rapid emaciation, and even collapse, with or without ocular phenomena, such as diplopia, amblyopia, and scotoma.

Recovery is the usual issue of the psychosis. The latter is not to be confounded with acute poisoning from cocaine, which we cannot discuss here.

The therapy is symptomatic (baths and tonics), and consists principally in gradually breaking off the drug habit.

CHAPTER XXVIII

CHLORALIC INSANITY

RATHER should we speak of chloralic dementia than of chloralic insanity. As a matter of fact, it is very rarely that we have phenomena of true insanity as a sequel to chronic chloralic intoxication. The chloralists are neurastheniacs or ex-melancholiacs who, having been subject to insomnia, have fallen into the habit of taking a dose of chloral at night before going to bed, and have been unable to give up the habit. They have a real dread of insomnia, and take this chloral in doses ranging from a very small quantity to 3 grammes every night. In the long-run they suffer more frequent accessions of anguish, lose their keen and ready intelligence, becoming torpid and somewhat degraded. Their memory is weakened along with the attentive capacity, and dulness becomes more marked. Meanwhile, they suffer from gastro-intestinal disturbances and become paler ; nutrition fails. In rarer instances hallucinatory phenomena supervene.

It is a good plan only to use chloral very rarely as a remedy for the insomnia of neurasthenia and states of depression, because the action it exerts on the brain does not contribute to raise the functional tone.

CHAPTER XXIX

SATURNINE INSANITY

LEAD-POISONING produces phenomena closely resembling those of alcoholic intoxication. Some authors, especially in France (Regis), even speak of an acute and subacute psychosis of dementia and of saturnine pseudo-general paralysis.

The acute variety very closely resembles the delirium in alcoholists. It is preceded by headaches, attacks of vertigo, bad humour, intestinal disturbances, insomnia, sometimes by somnolence. Examination of the urine often shows the presence of albumin. These phenomena are present for some time before the accession announces itself, but, should the attack be provoked by some psychic trauma, it may come on without being preceded by prodromata. Sleep becomes uneasy and disturbed by terrifying dreams. The accession bursts out in the form of sensory insanity, with illusions and hallucinations, generally terrifying, which quickly induce in the patient a keen and pronounced agitation with aggressive tendencies. The face is red, the eyes clear, the breath foetid, the attitude hostile, the temperature subfebrile. The patient, though he now presents a marked and characteristic tremor, is violent and obscene. The attack lasts one or two weeks, after which sleep returns, the agitation ceases, tranquillity is re-established, the hallucinations disappear, and at the same time the intellect is restored. It is no rare thing, however, for phenomena of collapse and even death to occur after the very acute phase of the attack, just as in acute delirium. In other cases the acute hallucinatory phase is followed, as in ordinary sensory insanity, by a condition of stupor, which has all the characteristics of the stupidity already described, with the addition of the general phenomena of lead-poisoning (bluish line on the gums, tremors, etc.).

In some cases, instead of sensory insanity, we have the development of acute melancholia, with features of hypochondriasis, accessions of anguish, and suicidal tendencies.

The attack of saturnine hallucinatory insanity may be followed by slow mental enfeeblement (secondary dementia), a condition

that sometimes is even primary, and is an effect of the alterations induced by the lead in the structure of the nerve-elements. Sometimes it is followed by a syndrome closely resembling progressive paralysis. This condition, pointed out by Tanquerel, and confirmed and well described by Delasiauve, was for some time regarded as true progressive paralysis from lead, especially by Devouges, until Regis, who was able to follow some cases and verify complete recovery, distinguished it from true progressive paralysis, terming it *saturnine pseudo-general paralysis*.

As a rule, the commencement of this paralytic syndrome is not gradual and primary, but follows upon an attack of acute insanity, which, as soon as the state of calm is established, passes into a new phase, manifesting itself with the *gravest characteristics of the confirmed stage* (Regis). These symptoms are mental enfeeblement, as in paralytic dementia, tremors, inequality of the pupils, impediment of speech, even to the degree of unintelligible muttering, more or less grave dementia, brief appearances of hallucinations and deliria, and a diffident, suspicious, wicked character.

Even when the mental disturbance (dementia) seems profound and grave, the patients after a period of time, generally not long, gradually regain their mental energy, which is restored to its former condition. As is apparent, this syndrome of saturnine dementia, according to some authors, differs in no way from ordinary progressive paralysis, except as regards its favourable issue—complete recovery.

I must add that I have not had any case under personal observation.

Sometimes apoplectiform attacks occur, followed by mental bluntness and hemiplegia, with hemianæsthesia, in all respects resembling hysterical anæsthesia. It is not improbable that these apoplectiform attacks are due to the albuminuria, and are of a uræmic nature.

The simple and the paralytic forms of dementia are often complicated by signs of cachexia (cachectic dementia).

Pathological Anatomy.—The alterations resemble those found in alcoholic intoxication. According to Lugaro, who has investigated the subject from the experimental side (*Riv. di Patolog. Nerv. e Ment.*, 1897), they consist in pulverization of the chromatic substance, and in disappearance of the fibrillar structure of the cell, with swelling of the protoplasm and shrinking of the nucleus. These alterations are much more evident in the spinal ganglia than in the spinal cord. In addition, there are found small blocks of coarsely granular yellow pigment in the cells of the spinal cord, cells with irregular contour, and deformity of the protoplasmic prolongations. These lesions are met with in the cells of the cerebral cortex, along with vacuolization of the protoplasmic processes,

which become deformed. In cases of long duration lesions are found in the vessels and the neuroglia.

Therapy.—The therapy is symptomatic as regards the psychic phenomena, but must have as its chief aim the prompt elimination of lead from the organism.

APPENDIX

SECONDARY DEMENTIA

ALL mental affections that are not followed by recovery terminate in the so-called secondary dementia. This condition has no place in our classification, because it is not a morbid entity, but an issue of all acute and chronic mental affections not followed by recovery. Amongst these I must make particular mention of mania, melancholia, sensory insanity, and epilepsy.

Whenever one of these maladies pass into dementia, the fundamental character of the primary affection loses its keenness; the false mental products (deliria) often remain, but are less active, finding less nourishment in a soil which no longer offers elements to sustain them. The whole morbid personality, even when restored within certain limits, and in one or other portion, is seen to be weakened, with limited, sometimes extremely scant, potentiality in all its manifestations and in all the directions of psychic life. The perceptive process being reduced and torpid, the intellectual patrimony diminished, what remains is so inefficient and of such small utility that it lacks the refreshing influence of interest which is based on the extinguished, or almost extinguished, emotivity and affectivity; the dement loses all capacity to display any efficacious action whatsoever in his environment.

In general, the dement is in part what he was when sane, with a mingling of the products of the malady, which, even though they also be reduced, yet give their stamp to the enfeebled personality.

Thus the melancholiac will continue to have the attributes of melancholia, and the maniac those of mania. Under the melancholic aspect, however, there no longer reigns the grief that first determined it, and the slowness of ideas, due at first to inhibition, becomes slowness from poverty and relaxed associative bonds.

The melancholiac who formerly suffered much and attempted to commit suicide, now, when he passes into dementia, repeats the same grievances in a stereotyped manner; but he no longer suffers, or suffers rather less than before, and makes no further attempt at suicide, except in the case where the suicidal tendency remains as a tic, as a blind impulse occurring insistently and irresistibly, even

after disappearance of the cause that first gave rise to it (cerebral automatism).

The deliria sometimes disappear, more often they remain, so that we may speak of a secondary dementia with deliria and a secondary dementia without deliria. A certain number of secondary dementias with deliria may be called secondary paranoias. The deliria are the same as in the primary affection, being simply continued therefrom, and when mental enfeeblement commences they become systematized. The patient repeats always the same delirious ideas, which closely resemble those of paranoia, more especially when of hypochondriacal or persecutory content. It is needless for me to enlarge upon this subject after what I have already said in the respective chapters on mania and melancholia.

Amadeo and Tonnini advanced good arguments in support of the belief that this form of secondary paranoia is curable. I am convinced that their views are correct.

Sometimes the mental enfeeblement is only apparent, being an effect of cerebral exhaustion, produced in its turn by the severity of the disease and its cause (intoxication). There is no doubt that the nutritive reintegration of the brain in some cases takes place slowly; in these cases the brain power returns by degrees, and at the same time the deliria gradually disappear (mediate recovery).

It is certain, however, that the conception of secondary paranoia was of considerably greater importance so long as sensory insanity was not recognised in all its forms, and when the paranoid and the melancholic variety, preceded by an acute sensory delirium, was mistaken either for mania or melancholia. Many secondary paranoias correspond to the paranoid forms of sensory insanity. We need occupy ourselves no further with these after what we have already written. The majority of dements who crowd the asylums are supplied by sensory insanity of one or other form, particularly the confusional and the paranoid.

The half of these patients who do not recover remain in the asylum for years and years, presenting always the same fundamental features of the primary affection (hallucinations, deliria). The various forms of acute dementia are indefinitely protracted. We do not know when the acute phase of the illness ends and when the chronic period of incurable dementia commences. *Dementia præcox* is prolonged and continued into terminal dementia. No limit can be laid down; no change of symptoms indicates the passage from the one condition into the other, save in some cases an improvement of the nutrition. Such dements remain for years in the conditions described, with few and insignificant modifications.

Epilepsy provides another contingent of secondary dementias. When the epileptic convulsions are frequently repeated, and particularly when followed by attacks of insanity, all the more if these are protracted, the mental powers all become enfeebled. Such

patients, whilst they show great reduction of the perceptive capacity, narrowing of the ideative field, uncertainty and lapses of memory in the most varied forms of dysmnnesia, whilst they are not concerned about their present state or their future welfare, and take no interest in the affairs of the family, are yet egoistic, querulous, impulsive, cynical, and wicked. The dementia always preserves a part of the old personality, and some of the features of the malady that gave rise to it.

Sometimes the consecutive mental weakness reveals itself only in diminution of the will-power. The mental patrimony is not essentially diminished, and the normal sentiments seem restored; but the whole mental life has become more feeble, a true interest in things is lacking, and the determinative power is very defective. Such patients have no depth of thought, sentiment, or action. There are demented in whom mental enfeeblement is not readily noticed, even though it be well marked. It is not easy to estimate the loss that has taken place without taking into account the intellectual vigour and the mental patrimony formerly at the command of each individual. Highly-cultured and talented individuals always appear better equipped than those who have not received a good education nor moved in high and intellectual circles. In such cases it is necessary to collect all such historical data as enable us to reconstruct the figure of the psychic personality prior to the malady, and in this way we shall bring into evidence the losses and the incapacities, as well as the alterations in the affective states. The man who used to take an interest both in his own and other's affairs, who played an active part, and engaged in struggles in public life, was enterprising, active, restless, who was concerned about his family, the health and the economic status of his children, now remains apathetic, indifferent, undisturbed by the course of affairs. The harmony of the human senses is interrupted for ever; in his mind there no longer vibrates and trembles any high sentiment; his intellect being dull and feeble, his conversation, when he is at all able to pronounce his words, is always very brief, and resembles the stereotypic repetition of a phonograph.

Infantilism is manifest in almost every position in life, belied only by the changes wrought by the years on the physiognomy and on the body, and by the old systematized habits.

In the graver and more advanced forms the incoherence, often manifest also in the actions, reaches the extreme degrees; the thought loses its syntactic and grammatical form (alogia, akataphasia); the indifference is very marked. The fall of the mental edifice is complete, but the ruins that remain allow us to judge whether they are those of the lordly mansion of a well-nourished mind or of the lowly hut of an intellectual starveling. With the help of these ruins and the stimuli that fall from the outer world into the still warm crucible, the dement sometimes forms new products

of no value, often rather of a negative value, and therefore hurtful. One patient many years demented, being very quiet and allowed to go about by himself, conceived the plan of mounting to a roof in order to reach home, and did not picture to himself the interrupting spaces between the roofs, and the probability of his being precipitated to the ground.

A great number of patients who remain massed together, as the *caput mortuum* of the asylums, dirty when not attended to, solitary, collectionists, given to squatting on the floor or in a corner, to throwing off their clothes and their shoes, to soliloquy, apathetic, or subject to brief phases of agitation accompanied by animal-like cries and curses, merely represent the ruins of human intelligence over which the disastrous storm of insanity has passed. Until a few years ago it was thought that the majority was derived from mania and melancholia ; to-day we know that only a small number belong to the latter psychosis, a few to paranoia, more to epilepsy, the majority to sensory insanity.

Secondary or consecutive dementia has an anatomo-pathological substratum more serious, more evident, and we may also say less reparable, than that of the acute curable diseases from which it is derived. Here we have to deal not with simple chromatolysis, such as we find in recent forms, but with a more profound degeneration of the nerve-cell, and especially that form of degeneration represented by yellowish globules of the same size, closely packed, of a vitreous aspect, collected, as a rule, at the base of the cell or near the nervous process or the protoplasmic prolongations, or even in other parts of the cell—a degeneration termed by Colucci *yellow globular degeneration* (*Annali di Neurologia*, 1897). It is a substitution for the substance of the cell, not only for the Nissl bodies, but also the reticular stroma. In addition to this form of degeneration, we find fatty degeneration, pigmentary degeneration, disappearance of the nucleus (termed also homogeneization of the nucleus), partial swellings of the cell or of the protoplasmic prolongations, thickening of these, cellular atrophy, deformity, necrosis, and vacuolization. According to Mondio (*Annali di Neurologia*, 1897), the degenerative process affects particularly the protoplasmic prolongations, and the axis-cylinder prolongation at a much later stage, or to a less extent. There is no doubt that in secondary dementia it is the neuro-fibrillar network that is chiefly injured ; in this case we get a true irreparable dissolution of the cell.

Lying amidst more or less profoundly altered cells, we find many others presenting a normal appearance. As a rule, there is also an accompanying increase of neuroglia ; here and there the vessels are sclerosed. Spinal lesions are not wanting.

Secondary dementia is incurable ; it is often progressive. The degeneration of the cortical cells is followed by other degenerative processes—in the liver, kidneys, heart, gastro-intestinal canal, etc.

Those patients who, at an early stage in their slow passage into dementia, show diminution of the affective excitability and a return to health, with improved colour and increase in weight, break down in the long-run, and often become hydræmic ; signs of spinal degeneration, with spastic paraparesis and sometimes parenchymatous neuritis, next appear.

It is unnecessary to lay down any line of treatment in cases of dementia. It is well, however, to recognise the fact that many demented may be restored to a personality which, while certainly reduced, is yet fairly well co-ordinated, and may be of some service within the narrow limits of asylum life. A series of observations has convinced me that in many cases the mental destruction is not so complete as it seems. It often appears to me to resemble a deep mental lethargy, or something buried alive. Training and re-education restore vigour to many of the elements of mental life, which may flourish again in some useful work or in some new adaptation. Many of the demented who are employed on the farms or in the offices of the asylums have proved capable of re-education to a serviceable life, modified according to individual circumstances, no matter what their previous condition ; with good attention, regulation, and supervision, they give partial compensation for their cost of maintenance.

CHAPTER XXX

THIRD GROUP—DEMENTIA PARALYTICA

(PROGRESSIVE PARALYSIS, GENERAL PARALYSIS, ETC.)

PARALYTIC dementia, one of the gravest of diseases, occurs frequently in some countries, and is characterized anatomically by a progressive degeneration (according to some, by a slow inflammatory process), which, commencing in certain nervous regions, in its ulterior development invades the entire nervous system. Clinically, it is recognisable by a progressive decadence of all the nervous functions—psychic, senso-motor, and trophic, up to the extinction of life.

Symptomatology.—The mode of onset varies considerably, and the multiplicity of symptoms is such as sometimes to lead the clinician astray. The disease is always recognisable at a more advanced stage.

Given the improper uses which paralytics may make of their own and others' means at the initiation of the disease, and the dangers to which their disordered and anomalous conduct exposes them, it becomes the task of the clinician, as obligatory as it is difficult, to diagnose the malady at its commencement, so that the social relations of the patient may be regulated at an advantageous time, and that the patient be brought under the influence of those methods of treatment that only then are capable of diminishing the intensity and checking the rapidity of its course.

Of the different modes of onset of the disease, the four most frequent and most readily recognisable are :

1. In one group there is, as a rule, exaltation of the various psychic activities. The individual becomes more enterprising, more active, more restless. His desires become more urgent and numerous, more irresistible and excessive; his objectives more grandiose, his projects vaster. He jumps to bold conclusions. The day's labour no longer satisfies him; he gets up at unusual hours in the night-time, and writes and calculates. He seeks out his friends oftener than before, expounds to them his plans, and

invokes their co-operation, frequently obtaining it. Absorbed in the mirage of his vast projects and his great social relations, he no longer adapts himself to the circumstances of the everyday family life as in the past, and becomes less tolerant of opposition. By degrees the apperceptive process weakens. The paralytic pursues his dreams. . . He conceives some foolhardy undertaking, into which he throws himself without reflecting upon the means to be employed, without pondering the matter in his mind, without foreseeing the obstacles that must necessarily arise, often without a well-defined notion of the end he has in view.

The business man lays in large stocks of goods, and cannot fulfil his obligations ; the medical man is on the eve of discovering, or has discovered, a specific for the cure of one of the gravest and most incurable diseases, and will become a millionaire ; the engineer has already devised a new railway scheme : it will meet with the approval of the Government, the funds will be forthcoming, and a large company will be formed ; the small proprietor sells his modest establishment, the sole resource of his family, because he must purchase a large estate, the returns from which will allow him to maintain horses and carriages. Meanwhile, each of them lives in a much more stylish manner at home ; the table is more sumptuous than formerly—rare and costly dishes are added to the modest menu, and wines and liquors flow more freely than before. All is merriment, but only to be followed very soon by the most implacable delusion. The poor Neapolitan carries his dream into effect. Having no faith in his own activity, he puts his trust in lotteries, for fortune will in the end smile upon him. He is now certain of securing a big prize, and with all confidence and certainty he risks the little he has, or what he derives from pawning his few pieces of furniture, in buying a number of coupons for his family of four persons.

The paralytic belonging to this group is more expansive, generous, and happy ; sometimes he is lively and witty. He is irritated by the least opposition, and breaks out into excesses, but, on the other hand, is fonder of his wife than formerly. Embraces become more frequent. 'He never enjoyed such excellent health ; not even in his youth did he feel so strong as now.'

Amidst this functional hyperactivity, more apparent than real, we perceive some characteristic signs that may from the very outset suggest to our minds the disease which later will reveal its cruel and relentless nature. These fundamental notes consist in the real weakness of the various psychic manifestations, and in the complex degradation of the intellect and affections, ill concealed by the hyperactivity described in the excessive boldness of his undertakings. We readily perceive a contradictory superficiality of judgment, a puerility of the notions and a disorder of the conduct. A literary person commences to attribute very great value to the

work he published a few years or several months previously. He believes it superior to all the literary productions of the period, expects from it very great triumphs and immense profits. He conceives not merely one but several works, 'which will all have a surprising effect.'

Whilst nothing yet exists of the work announced, the author straightway embarks upon a scheme for another, the plot of which he likewise announces. His mind is occupied only with new projects, and with castles in the air. He does not notice the material that he lacks. In other instances, however, he actually sets to work with unaccustomed ardour. He does not sleep; he writes and rewrites in large scribbling diaries that generally make the most decided contrast to the bombastic announcement first made.

The paralytic writes and expounds projects and enterprises just as his unbridled and unruly fancy suggests them to his consciousness, and whilst he promises himself immense profits from his negotiations, etc., it is easily seen that he is incapable of orientating himself in his environment, in which he moves like one who dreams, and that he arrives at inferences without premises, at conclusions that lead to disastrous conduct. Not a few links are wanting in the connecting chain of his thoughts, which often lack any foundation in fact.

It is as if centripetal rays passed through a system of lenses which projected into the field of perception an enlarged image, which gives unusual incentive to the mechanism of conclusion. Thus it is that the paralytic has a foretaste of wealth, luxury, and pleasure, and though he has not yet obtained any of the results he dreamt of, he rises heedlessly to the level of that future grandeur, and inconsiderately squanders all he possesses, ruining his own and his family's interests, and often going through considerable fortunes.

On every attempt to reason with him he shows his weakened judgment, and the exalted sentiment of his personality and capacity, as well as his intolerance of opposition. Woe to him who places obstacles in the way of the patient in this stage, or who attempts to make him understand the irrational character of his assertions and deeds! He then loses all sense of propriety, pours out invectives against everyone, forgetful and unheeding of the proprieties and expediencies which he formerly carefully observed.

Parents, formerly very affectionate, neglect their family; exemplary husbands give themselves up to amours, and without shame or reserve visit the houses of prostitutes.

Those who formerly were jealous of all the most delicate social conventionalities now continually frequent resorts of evil repute, and use trivial and obscene language. Should they find themselves in a company of friends amongst whom are ladies, amidst general consternation they address to the ladies words that are unusually

gallant and even lascivious. There is generally a more or less marked loss of moral sentiment, of shame, and of the sense of decency. The character changes with the greatest facility, because the conventional scruples of society are negligible features of their mind.

To this there is added very early, sometimes even before these changes are noted, loss of memory.

The amnesias and the change of character, not so evident in the early stage as to attract the attention of their families and their friends, but of no small value for the clinician, put us on our guard as to the true nature of the disease. Sometimes we have to deal with persons occupying very responsible positions, who in the past have been very attentive, and now readily forget matters of which they had hitherto been very mindful, matters whose accomplishment had become a habit. Important business appointments are no longer fulfilled, promised medical visits to patients and families are not paid, discussions in tribunals are completely forgotten, or it may be that the key of the safe, formerly guarded with the utmost care, is left in the lock. Names of friends and close acquaintances may no longer be remembered; the patient mixes dates, facts, and promises. When he writes he leaves out letters or syllables in the formation of words, or entire words in the composition of phrases.

Meanwhile, the organic desires are also often increased in intensity. We have already remarked how paralytics abandon themselves more readily or rashly to sexual pleasures. At the same time, they often eat and drink more than ever before, with these excesses hastening the onward march of the disease.

Insomnia is frequent, and sometimes is painfully felt by the patient. It is one of the few things of which he complains, though sometimes he turns it to some account, inasmuch as it drives him to that active or restless life manifested particularly at night-time, which always hastens the development of the disease.

It sometimes happens that during a lucid interval or a period of depression the patient becomes painfully conscious of his psychic alterations, and especially his mental insufficiency, and he then seeks the assistance of the physician. This, however, is only a fleeting reawakening. For the most part the patient betrays an exaggerated sense of well-being. Never has he known himself to be so strong as now, never before has he been able to undergo such intense fatigue, nor has his intellect ever been so ready and certain. In reality, however, the same enfeeblement that has overtaken his psychic activities is found in his greatly diminished muscular power.

Progressive paralysis may apparently commence with an attack of acute delirium (cases of Zacher), which in this case also, as in acute primary delirium, is determined by an infective agent, which breaks the insidious advance of the paralysis. We may note also the passage of the mild maniacal form into the typical variety, often resembling grave mania. These accidents, however, do not

to any great extent increase the difficulty in diagnosis, when we take into account the mode of onset of the disease and its somatic features.

The condition described may be followed by a progressive amelioration, or a truce of longer or shorter duration, after which the features of dementia or the deliria, or both together, become more pronounced. The patient's condition is aggravated: the association of ideas becomes ever less logical; the inhibitory powers become continually weaker; every new perception is incomplete, and does not add to the intellectual capital of the paralytic. The memory becomes ever more unfaithful and lacunar; he mixes facts, dates, places, and persons with whom he was formerly familiar, forgets their names, and ascribes to one or other characteristics that have no existence or have reference to other times and other persons; if he writes, he omits letters, syllables, whole words, and wanders from the point. Altogether we notice a progressive loss of former acquisitions, dissociation and disgregation of the personality, and on this soil the delirium now flourishes and reaches its greatest intensity.

2. The second variety is characterized by progressive depression of all the mental faculties. The aptitude for work becomes gradually diminished; the individual often complains of feeling tired and worn out; the attention is weaker, the powers of comprehension and judgment are diminished; the patient gradually becomes more incapable; not only are new acquisitions difficult for him, but even those previously acquired become lost. This threatening initial mental decay is generally noticed very early by the patient, who becomes alarmed thereat, although in other instances he progresses unconsciously to the ulterior stages of the malady.

There is no intellectual and affective function that is not overturned in this decline and fall of the personality.

The loss of memory is marked, the memories of the past being somewhat more resistant than those that refer to very recent times; in any case, however, we have always to do with faint, uncertain, fragmentary reminiscences, without precise determination of time, place, or person.

The ideative content becomes steadily more impoverished and baroque, and, owing to feeble associations, moves in always more restricted spheres. No delirious ideas exist.

Along with the mental decadence, the psychic personality becomes altered in all its attitudes. For the most part the patient is dull and somewhat preoccupied; he knows he is not what he once was, but does not understand the change that has taken place in him. The mental tone is variable, so that we often find superimposed on the sad face an infantile smile or a sign of good humour, whilst he spends his days more or less in apathy. By degrees he becomes more indifferent towards his friends and family, takes no interest in the domestic management, neglects the more important business, is

inattentive, dazed, and not easily moved ; his physiognomy has lost its wonted lively expression.

As may readily be judged, this form has many points in common with neurasthenia and melancholia ; but the rapid progress of the dementia and the somatic facts accompanying or appearing soon after the onset of the disease, above all, the disturbances of speech, guard us from error. There are cases, however, which for some years present no other feature than the syndrome of neurasthenia—a feeling of malaise, great preoccupation about the personal health and prevalence of hypochondriacal ideas, dread of falling ill, despondency, and often also, along with this syndrome, severe cephalalgia and impotence. It may be impossible to detect any somatic sign of real semeiotic value ; doubt arises from the progressive nature of the neurasthenic mental decadence.

3. In the third group the malady commences with somatic symptoms, or at least a predominance of these, whilst the mental disturbances are much less prominent or very rudimentary. These patients commence to notice various qualitative disturbances of cutaneous sensibility, as in *tabes dorsalis* ; they suffer from headaches, neuralgias, and sometimes ophthalmic hemicrania long precedes the illness (Charcot, Féré, Perinaud). The most frequent and characteristic symptom, however, is defect in expression of thought, whether by speech or writing. At first the patients feel a greater resistance, as it were, in the formation of articulate sounds, and this disturbs them and preoccupies their minds. Then commences a certain slurring in the pronunciation of some syllabic sounds, especially the labials, dentals, and palatals, as though due to diminished force ; or an inco-ordination which generally alters the constitution of the more complex sounds, and gradually involves the simpler, according as one or other part of the articulatory apparatus is invaded by the degenerative process.

The simple slurring mentioned above attains gradually to complete disappearance of certain articulate sounds or a vocalized stammering that has no more than the semblance of articulate sounds.

We have to deal with partial and temporary paresis or paralysis of certain muscles, with the inopportune and sometimes sudden and capricious intervention of certain other muscles, with unequal distribution of nervous energy, with the increased time required by the latter to traverse obstructed or collateral paths, giving rise to disturbance of the function of one or other part in particular of the apparatus of phonation, respiration, and articulation, which concur, in a given space of time and with a given amount of energy, towards the expression of thought and speech.

We get various articulatory disorders of speech. The so-called *bradyalalia* is where the speech is slow and hesitating ; the syllabic sounds are fully articulated, but are detached from one another,

and there is a longer interval of time between them, as, for example, fa-mi-ly. In most instances, however, this disturbance is not the only one; the sounds may be softened or otherwise altered, or they may be tremulous, or the vowel of one syllable is dragged out till it reaches the following syllable—*e.g.*, f-a-a-a-mi-i-i-ly-y. Sometimes the syllabic sounds constituting a word are reversed; the various syllables are pronounced in a position different from what they would have in the correct formation; or the vowel-sound alone of each syllable may be reversed—*e.g.*, wolling hirse, instead of willing horse—giving a kind of paraphrasia that goes by the name of syllable-stumbling. This syllabic transformation is often of such a degree that the speech becomes quite unintelligible; it is the most frequent defect of speech at the commencement of progressive paralysis, and appears to depend upon a disturbance in the ideative field from defective attention, rather than on a true disorder of articulation.

In addition to these disturbances, we meet with lisping, which consists in this, that at the moment of expiration the function of the expiratory muscles is inhibited, and substituted by that of the inspiratory muscles. We thus get an interruption in the act of connecting the vowel to the consonant: expiration, which should be co-ordinated with the movements of phonation and articulation, is substituted by an inspiration for the most part partial and momentary.

Sometimes there is a spasmodic condition resulting in an explosive formation of sounds, giving rise to the so-called scanning or staccato speech, with all the intermediate forms up to stammering, which in this case has by no means the same significance as the spasmodic laloneurosis known by that name. All these disorders may occur singly or be associated in the same patient, and as they advance language becomes reduced to a string of unintelligible sounds.

In rare cases we meet with the temporary disturbances of speech noted by König, and consisting either in tonic spasms of the muscles of speech or of a momentary pause, during which the muscles of the lip are seen to move, but the patient's efforts to speak are in vain. After a few seconds he commences to falter, and then regains his normal speech. During the pause the verbal images and the comprehension remain normal.

The disturbances of speech, and, in a minor degree, some alteration in the timbre of the voice, often constitute the first symptoms of progressive paralysis, when all the morbid psychic phenomena are absent or incapable of detection.

Paralytics have often a dim consciousness of these disturbances, and at intervals become concerned about them. Syntactic and grammatical errors commence to appear in their conversation; phrases are left unfinished; there is rapid passage from one order of

ideas to another, or, though there may be a complete conception to express, they fail from time to time to find the corresponding words and resort to circumlocution. In order to appreciate properly the extent of the disturbance, it is necessary to know the previous degree of culture of the patient.

The same disturbances are observed in the writing ; it is slower, uncertain, and unequal. The handwriting itself presents new irregularities ; the strokes are unequal, tremulous, and in some parts zig-zag, while their sloping varies considerably ; there is exchange of vowels, substitution of consonants, syllables or words half-completed. At the same time there are noticed grosser grammatical errors, though not till a later period do we find dyslogic disorders. Very cultured persons commence to fall into frequent errors in spelling ; they are no longer apt in the grammatical inflection of words, particularly verbs.

With the disturbances of speech are associated other somatic features, such as tremors, disorders of innervation of the pupils, exaggeration or abolition of the tendon reflexes, and disturbances of sensibility. This symptomatic complex, which in many cases may occur by itself for a time, would constitute what might well be called the somatic form of progressive paralysis. It is not that psychic disturbances are entirely wanting in this variety, but that in the early stages they are less evident. There is generally a depressed state of mind, an unwonted slowness of the psychic processes, a dim presentiment of being threatened by some disease, and an effort to hide the deficiency of which they are already conscious. The precautions they take to conceal their disturbances, especially of speech—in this respect often appearing childish—the pretended gaiety that some, particularly very young patients, assume, and the false statements as to their health and well-being, are in open contrast with their mental preoccupation. Meanwhile, we note a ready distraction, listlessness, negligence, low spirits, a certain lack of interest in anything they do, affective irritability, and exaggerated emotivity. Disorders in the sexual sphere are more pronounced in this class than in the other. Impotence often precedes the disease for two, three, or five years. From time to time the ideative process is besieged by sexual obsessions, and the idea and desire, irritated and rendered more obstinate by repeated failures, instigate to fresh attempts that are always unsuccessful, and attended with greater damage to the nervous system. At one time the defect consists in an erotic orgasm, at another in feeble, insufficient, or totally absent erection, or, again, in too ready ejaculation. This often constitutes the greatest torment of these patients before the onset of the other symptoms we have mentioned. In many cases the tabetic syndrome long precedes the attack.

4. In the fourth group we have individuals who have always enjoyed very good health.

Some vertigo, some fleeting confusion, sometimes headache, such as a feeling of weight or fulness in the head, and attacks of ophthalmic hemicrania—these constitute all that we can gather of the history of the commencement of the disease. In other cases the premonitory symptoms consist in an unwonted affective excitability, irascibility, an inner restlessness, an inexplicable discontent, symptoms to which even the expert clinician can assign no decided diagnostic value. One day, however, the patient is struck down by either an apoplectiform or an epileptiform attack.

When the attack is over there often remains a restriction of the intellectual and affective field, but cases are not wanting in which we get a complete restoration.

After several weeks or months, sometimes even a year, when everything leads to the belief that all danger is past, the attack is repeated, generally with increased intensity. The subsequent psychic depression lasts longer on this occasion, and restoration is more difficult and also less complete.

We notice a weakness and a want of determination that are quite new. The mental tone is depressed. At this stage we may already observe somatic and psychic signs of progressive paralysis, but it frequently happens that we get a comparative restoration lasting several months or even a year or so. Later on, the repetition of the attacks or the slow development of the symptomatic picture of paralytic dementia will reveal the true nature of the malady.

These four modes of onset of progressive paralysis are the most frequent, but not the only ones. Sometimes the disease commences as an acute lypemania, with suicidal tendencies and sitophobia, or as acute sensory delirium. In rare instances it begins with delirium of persecution, as in paranoia, or with delirium of grandeur, without any premonitory symptoms (case of Hugues). When any of these symptomatic complexes form the prelude, simulating a simpler form of psychopathy, after a longer or shorter time, according to the case, the symptoms ameliorate; and when everything leads to the hope of a very early recovery, graver phenomena enter upon the scene.

The distinction between the symptomatic groups, justified by the mode of onset of the disease, is not so manifest at a more advanced stage. It is not that there do not then exist very marked differences in the various cases, and perhaps even more marked than those that are revealed in the initial phase; but that in the ulterior course of the disease we meet with such a confusion and concentration of all the symptoms thus far described that it is impossible to draw a rational distinction between the different aspects that the malady may assume. In any case, no practical result would follow, because, notwithstanding the views of Christian, who shows great concern

about the diagnostic difficulties in paralytic dementia, no true difficulty, such as characterizes the often insidious commencement of the disease, now presents itself to the clinician.

The disease assumes a different character, according to the individual organic constitution, the particular degree of culture previously attained by the patient, and the individual tendencies. Nevertheless, there are always characteristic features common to all the varieties of dementia paralytica which serve as a sure guide to the diagnosis.

The progressive diminution of almost all the cerebral powers has now reached a very significant degree, and enables us to differentiate the disease from lypemania, hypochondriasis, mania, and primary hallucinatory insanity.

There are two psychic facts that are of the utmost importance : one is essential—viz., dementia ; the other unnecessary, but very frequent—viz., delirium. It is wrong to regard the dementia as almost a secondary feature. A scrupulous examination will reveal its existence even from the initiation of the disease, which shows itself by psychic decadence in all the manifestations of the patient, both within the small sphere of domestic life and within the large circle of the social relations.

From the expression of the physiognomy to the character of the gaze, from the latter to the attitude and to the behaviour in the management of affairs, everything goes to prove a state of mental decadence. The almost set expression of the physiognomy, the relaxed features, the lifeless, often questioning look, the mental slowness or incoherent instability, the incapacity to pay attention, the considerable or slight lapses of memory of things recent and past, the superficiality and the infantile errors of judgment, his childishness shown in the facility with which he is controlled, and the possibility of making him believe anything, the exaggerated sense of well-being, without the proportionate readiness of the psychic processes, which we meet with in the maniacal, the complete abstraction from any comprehension of his real position—all these, even at the commencement of the malady, when characteristic somatic disturbances have not as yet appeared, show clearly the accompanying intellectual degradation in all its phases down to complete liquidation of the psychic personality.

Deliria arise, and, whether expansive or depressive, always bear the character of the soil in which they have developed, and cannot possibly be mistaken for other similar deliria.

The delirium of grandeur, unless in some rare cases where it is the first thing to announce the appearance of the disease, may, in a manner, be regarded as the continuation of that first variety which we have described in speaking of the initial phases, and it gives to the disease the character of a maniacal form. When the personality is exalted, the sense of well-being is increased, the con-

sciousness of the patient is dysorientated, and the soil for the development of the delirium is then well prepared.

It rapidly loses the appearances of probability, and becomes unbounded, paradoxical, changeable, and stupid in form and content. If the patient is a business man, he asserts that he is doing a marvellous amount of work, that he will open the largest warehouse that has ever existed, that he has already greatly increased his funds, and is going to start a great industry, etc. Hardly a day passes but he affirms that he has 'acquired all the factories in the valley of the Irno'; that he is now a millionaire; that he owns 'all the shops in the Via Toledo, and will have them splendidly illuminated, so that they will be a more beautiful sight than any ever witnessed before. There will be splendour and fortune for everyone.' From this stage the paralytic passes to the possession of billions, trillions, etc., which he gives away to the first one who makes a good impression upon him.

A dealer in cattle says that he possesses a hundred oxen, which will forthwith become a thousand, ten thousand; then, 'They will be yoked to as many carts laden with precious objects'; later on he becomes a king, an emperor, etc.

A lawyer gives lectures on the best mode of increasing the public wealth, thereby provoking hilarity, until one day he is stricken down by an apoplectic attack.

A poor working man affirms that he has princedoms, kingdoms, empires, or valleys full of gold; another, who in his past life had tendencies to religious practices, asserts that he is the Pope, that he is even God, above God, that the destinies of the world depend on him, that he can make the stars move and fall down, and so on.

The paralytic is astounding in the excessive nature of his delirious conceptions, owing to which he becomes generous and prodigal without limit. In this respect he shows himself absolutely lacking in judgment. Let him only be encouraged in his phantasmagorias, and he will offer to give away thousands, millions, to bestow wealth, happiness, and power; whilst soon after, if he be contradicted, he will threaten one with annihilation.

Such patients squander large sums of money in dinners and feasting with acquaintances and even strangers. Even in the asylums they continue to give invitations. It often happens that during the medical visit a paralytic comes forward, and says: 'To-night I will give a grand dinner in the Caffè di Europa. You, Signor Director, will not fail to honour me. There will be lots of dainty dishes never before tasted, and the banquet-hall will be a magnificent sight!' If he is then interrupted, and told that he is talking nonsense, and that he is an unfortunate patient confined in the asylum, he remains irresponsive, and cannot adduce any argument in support of his invitation, which he then abandons, only to present it again soon after in the same or another form.

This grandiose delirium is very variable. From day to day the delirium and the mental disposition change. The paralytic who promises one million to-day wishes to give twenty to-morrow, and the day after asserts that he has nothing at all. One day he is a prince, then a king ; another day he is the Pope ; another, God ; then he becomes silent and rather uncertain. On another occasion he comes forward and says : ' I have the largest diamond in the world ; it is bigger than my fist, and in the night-time it illuminates the room. I have it in my desk at home.' He repeats this story for a week, then nothing more is heard of it ; when reminded of it, he maintains an attitude of indifference.

Such delirium is not deeply fixed, and cannot be maintained against the arguments of contradiction.

In manifest contrast with the bodily condition, which is always becoming weaker, the feeling of strength and well-being is strangely exaggerated. The paralytic, who with difficulty can stand erect on his legs, and who, owing to tremors and weakness, is unable to perform certain delicate movements, speaks of his great strength and boasts of his ability and capacity, maintaining that he never felt so well before, that he can run many miles without feeling tired, etc. Everything reveals the most classic and generalized psychic weakness. The paralytic loses all sense of reality, and, leading a dreamy life, forgets what he said but a moment before, and so becomes incoherent and contradictory in all his statements. He does not hesitate to utter extreme improbabilities, and can bring forward no plausible reasons for the announcements he makes ; he lends himself only to representations of stupid and absurd dreams.

Other deliria of various contents alternate episodically with the delirium of grandeur. The most frequent is the *melancholic delirium*, accompanied always by signs of progressive dementia.

Such delirium either appears very suddenly or develops slowly on the depressive basis of mind, and sometimes goes on to the most characteristic manifestations of progressive paralysis. In other instances it alternates with states of exaltation (circular form of progressive paralysis), or it is simply an episode in the first or second stage of the disease.

The patients are sad and bemoan their unhappiness, though they do not know in what it consists. In their incertitude they are afraid of being lost and ruined. The gloomy prospect of the future discourages them ; an inner restlessness takes possession of the disordered mind. Whilst at the commencement of the disease they were conscious of, and naturally concerned about, the mental decadence which they observed and studied with anxiety, now the object of affliction has gradually vanished from the visual point of consciousness. From this point to the delirium the road is short. They declare themselves sinners undeserving of pardon, accuse themselves of crime, having committed enormous thefts and merited death ; and

so, governed by these delirious ideas, they are sometimes goaded on to suicide, which in this case is suggested by the delirium, just as at the beginning of the disease it is suggested by the inability of the patient to prevent his progressive decadence (own observations). When these melancholic manifestations occur at an advanced stage of the disease, it is easy to judge their nature by the accompanying features of dementia. The deliria are not well marked, the affectivity weak, the associations feeble, so that the patient passes readily from one idea to another, often in complete contrast with the preceding, and as readily abandons these delirious ideas. Sometimes in the course of melancholic utterances the patient launches forth a strange idea of grandeur, and even his melancholic manifestations themselves may partake of a grandiose character.

In this state it is not uncommon for paralytics to mutilate themselves. The melancholia not infrequently passes into stupor, in which case, owing to the absence of manifestations of speech, it is more difficult to form a judgment, unless we are aided by the somatic phenomena, the preceding history, and some other phenomena first indicated by Baillarger, such as the relaxed condition of the features, the uncertainty of the look, the passive action of the muscles, or, *vice versa*, a katatonic condition.

The *hypochondriacal* delirium, well studied by Baillarger, is frequent. In these cases the patient gives utterance to the strangest and oddest sayings. A woman sees a bone lying on the roadway, and believes that it belongs to her own body; other patients have no eyes, no head, no legs, or do not feel them; the throat is obstructed, the eyes have left their sockets, someone is walking in their intestines, or devils are fighting there; they have no longer any anus, and have had no body for months (delirium of negation); yet they eat regularly, and pass excreta. In some cases the body or its individual parts seem to the patient much reduced in bulk (delirium of smallness, or the so-called *micromaniacal* delirium of A. Voisin). The patients believe they have become dwarfs; their hands are atrophied, their legs so small and short as to be unable to sustain the weight of the body. The opposite delirium is suggested by an exalted kinæsthesia. One patient in the Sales Asylum was unwilling to leave his dormitory or to go into another room, because his body was enormous; he was excessively large, and correspondingly strong. 'See,' he said to me, '*the great height I've reached. Look at the size of my chest and the beauty of my form!*'

The depressive delirious ideas sometimes assume the same hyperbolic character (A. Voisin's delirium of exaggeration). It is a true melancholic megalomania that may be said to be characteristic of dementia paralytica. One patient has been suffering for six thousand years; another has three hundred worms in his stomach; another complains that they wish to open his belly to get possession of the precious diamonds contained therein. Similar deliria

are met with only in senile dementia, and these much more rarely.

The delirium of *persecution* also is not uncommon. The diagnosis is easy. In paralytics we perceive no true organization or systematization of the delirium, no perplexity in the delirious affirmations; there is less coherence between the ideative content of persecution and the conduct of the patient, less logical participation of the affective states in the delirium, no gradual substitution of the delirious for the normal consciousness. In addition to this, delirium of persecution in the paralytic may be episodic.

In the course of the disease an *acute sensory delirium* may arise, preceded by a few prodromata—headache, restlessness, increased excitability, intolerance of the least opposition; or multiple hallucinations, most frequently of a terrifying nature, may even arise suddenly, promptly giving origin to mental confusion and intense agitation, with verbigeration, impulsivity, congested face, elevation of temperature of one or two degrees, marked tremors, dry and coated tongue, refusal of food, constipation, insomnia, etc. I am unable to state definitely whether this condition is due to cerebral congestion or a true toxæmia which finds favourable conditions for development in the organism of the paralytic. In any case, it is always one of the gravest accidents, and often determines death within a short time, or, in less serious cases, gives rise more rapidly to advanced degrees of dementia.

Besides the episodes of sensory delirium, we frequently have sensory disturbances varying in degree and content—illusions most commonly of all, then the so-called psychic hallucinations, and not rarely true, vivid hallucinations. Amongst eighty-eight paralytics, Geill found twenty-three with visual and auditory hallucinations, apart altogether from the question of their being alcoholists or not.

Whatever be the form assumed by the malady, provided acute delirium, pneumonia, an apoplectic attack, etc., does not cut the patient off, the most complete mental decay is not long in showing itself. The circle of ideas becomes invariably narrower; notions of any kind whatsoever become faint, uncertain, and confused; the smallest defects become great intellectual losses. Even the delirious ideas gradually lose their colouring, and become disconnected; the patient no longer has any desire; he is indifferent, absurd, and stupid, and is no longer capable of the simplest forms of expression.

No longer does any sentiment, any affection, stir the mind of the paralytic. In their places we find some irrational outbursts or brief phases of motor agitation of the most incoherent type, during which he is often noisy and sometimes aggressive.

Language, when not reduced by articulatory disturbances to an unintelligible muttering, is very slow in its manifestation, and very poor. The life of the paralytic in the last stages is a particu-

larly vegetative one. The personality is destroyed, and the consciousness is now melted in the infinite azure of the universe. He gives expression to his state of well-being, even when he is incapable of a single thought or an adequate volitional movement; when, through weakness, or paralysis, or contracture, he can no longer leave his bed; when, owing to vesical paralysis, his urine has to be withdrawn by the catheter; when deglutition is difficult; when many parts of the body are covered with threatening bedsores, and cachexia and marasmus are hastening him on to another world.

Somatic Phenomena.—Since there is no rule as regards either the time or the site of invasion of the morbid process, the somatic symptoms vary accordingly, and are combined in different manners with one another and with the psychic disturbances, obeying no law with regard to the time of their appearance or their combinations.

Tremor is one of the most important of the somatic phenomena, and it presents special features in the site, form, and number of oscillations. In the face, the first muscles to be attacked are particularly the zygomatic, the elevators of the pinna, nose, and upper lip, the orbicularis oris, and the muscles of the tongue. It is to be noted, however, that there are cases in which the hands are first affected. This tremor is not manifested in a state of repose, but during voluntary movements, and especially at the very beginning of a movement. This explains why it is that the tremors of the face are more marked when the paralytic commences to speak, and the tremor of the tongue when he attempts to protrude or retract it. Very often I have noticed tremor of the lower jaw in the act of opening the mouth. In these cases it is seen that the lowering of the inferior maxilla is not uniform, but is broken into from two to four oscillations. Sometimes, as I have said, the tremor appears first in the hands, and manifests itself in the writing.

The oscillations are rather unequal. On the whole, they appear to be choreic movements reduced to small proportions. Every muscle, and often every muscular segment, presents separate contraction; therein lies the chief reason of the great inequality.

It is particularly in the most delicate and complex movements, such as writing, that the tremor is apparent.

As in almost all other forms of tremor, here also we have to deal with a loss of excito-motor power in the paths and various muscles concerned in a given movement. Effort increases and exaggerates the tremor, and the will is incapable of restraining or concealing it.

These characteristics show that the motor phenomena and the psychic manifestations are marked by the same law, which is summed up in the incontinence, the diffusion with loss, the disproportion, the want of rhythm, and the ready exhaustion of the nervous dynamism. Inequality of the oscillations of the tremor points to

inequality and incoherent mobility of the psychic waves, which rise unexpectedly and fall with great rapidity. In some cases the ready occurrence, even in the state of repose, of groups of contractions represents in the motor field what in the psychic sphere is represented by the insurrection of ideas and emotions without associative bonds, so characteristic of some hereditary forms of progressive paralysis. The spreading of the volitional motor impulse over muscular groups, the defect of fusion and direction of the psychomotor currents, which in some paralytics reveal themselves in great excitability when they speak, and in the useless participation of some of the facial muscles, correspond exactly to the ready reawakening of mental representations that disappear almost as soon as they reach the threshold of consciousness.

The rapid weakening of movement in the paralytic corresponds to the defect in judgment and depth of thought. The convulsive mode of commencement of a volitional movement undoubtedly corresponds to the vividness of insurrection of the mental representations, which become exhausted in their sensory element. The gait of the paralytic is awkward, tottering, and feeble, except in the first stages of the disease. Even in those cases in which we get delirium of grandeur we rarely observe that self-assured carriage, that proud bearing, observed in megalomaniacal paranoiacs. There is no energy in the movements. On the contrary, there is often hesitancy, uncertainty, and sometimes inco-ordination. His step is slightly longer, less rapid, cumbersome, and heavy; he requires a larger base, and raises his feet but slightly from the ground. According as spinal or cerebral lesions prevail, the gait assumes either tabetic or paralytic features.

In the end the patient can with difficulty stand erect on his feet; he stumbles over every slight obstacle, and it becomes necessary to guard him against dangerous falls by keeping him in bed, where he remains immobile, calm, or restless, as vacuous as he is powerless. In the last stages contractures are often set up in the lower limbs, preferably the flexor muscles, and the patient lies curled up in bed. The majority of paralytics grind their teeth. Atrophy sets in in some of the muscles, especially the interossei; other muscles present an exaggerated mechanical excitability and fibrillar movements. Paramyoclonus is not uncommon. More rarely we observe the claw hand.

The paralysis may overtake the muscles of deglutition, thus giving rise to the danger of suffocation. Such an issue may even occur at a not advanced stage of the malady, owing to early involvement of the bulb in the degenerative process, as well as in voracious patients.

Disturbances of sensibility are also frequent, especially in the advanced stages. Not only is perception defective and deficient, but the peripheral coefficients necessary for normal perception are

in reality much diminished. Mere noticing of objects is possible, but not differentiation and discrimination. This applies particularly to taste and smell.

Investigations carried out in my clinique by the oculist Sgrosso showed that of forty-seven cases of progressive paralysis the pupils were unequal in thirteen ; in twenty-five the pupils reacted to light and in accommodation ; in fifteen slightly or not at all. In agreement with Moeli, Utroff, Siemerling, I have found that in a certain number of paralytics the pupillary reaction to light is retained, whilst in another large group there is complete pupillary rigidity on both sides. Sometimes one eye does not react directly to light, but participates in the consensual reaction, while the eye that reacts directly shows no consensual reaction with the other (Redlich). Irregularity of the pupil is common. Nystagmus is sometimes observed (Olliver) ; paralysis of the external ocular muscles occurs very rarely (Bödicker). In a few instances I have observed strabismus. Diminution of the visual acuity is very common ; only in seven out of forty-seven paralytics examined by Sgrosso was it found to be normal. The colour vision is also altered, and the visual capacity for the form of objects is subnormal (Olliver). The visual field shows concentric restriction sometimes in the first stage of the disease, almost always in the confirmed stage (Sgrosso).

Ophthalmoscopic examination reveals the presence of pupillary atrophy, which hardly ever attains a degree of complete atrophy, as in *tabes dorsalis* (Sgrosso, Olliver, and Wigglesworth).

A varicose condition of the veins of the optic papillæ is often met with. We are not, however, warranted in concluding that to a given degree of general paralysis there correspond constant ophthalmoscopic lesions. Further on we shall speak of the histological alterations in the retina, which may explain all these functional disturbances.

A great importance has rightly been attached to the behaviour of the tendon-reflexes in their relation to the pathology and diagnosis of progressive paralysis. In this regard the observations may be classified in the following categories :

1. Cases in which the patellar reflex remains normal up to an advanced stage of dementia paralytica.

2. Cases in which it is much weakened or absent from the beginning, and sometimes long before the disease reveals itself by other symptoms.

3. Cases in which the tendon-reflex is much exaggerated (more commonly in the expansive forms), and remains so throughout the entire course of the disease, or else, with the advance of the disease, becomes gradually weaker until it is quite extinguished.

4. Cases in which the patellar reflex is normal or exaggerated on one side, and weak or absent on the other.

The behaviour of the patellar reflex often coincides with tabetic

phenomena. The tabes either exists prior to, proceeds parallel with, or follows, the dementia paralytica.

The abolition of the patellar reflex, associated with loss of power, without any other disorder, is frequent. Psychic depression, with loss of memory and abolition of the patellar reflex on one or both sides, constitutes a characteristic syndrome of dementia paralytica. Other observers, amongst them Seppilli and Beatley, have arrived at the same conclusions. Amongst sixty-five cases of dementia paralytica, Beatley found the knee-jerk normal in eleven, slightly increased in eight, clearly exaggerated in eighteen, diminished in five, and absent in eighteen ; in five cases it behaved differently on the two sides.

In addition to the symptoms described, there are others which are less common, and which we may rapidly pass in review.

Muscular atrophy in progressive paralysis is limited to the interossei and to the muscles of the forearm. Much less commonly do we find the muscles of the trunk and lower limbs affected. There is no true reaction of degeneration, but only a quantitative alteration, associated with a greater slowness of the curve of the electric contraction, or it may be an alteration in the contraction provoked by percussion of the muscles (increased mechanical excitability of the muscles). Lenzi, in the course of methodical clinical investigations, has observed an intermediate form of reaction of degeneration, consisting of equality in reaction on kathodic and anodic closing and opening, and slowness of the muscular contraction and relaxation (*Annali di Neurologia*, 1899). Judging from personal observations, I would say that the atrophies, infrequent as they are, coincide with the alcoholic habits of the patient.

Bedsore develop with great readiness in some paralytics wherever pressure is exercised on the skin ; they occur most frequently over the sacrum, the iliac crest, the back, the knees, the elbows, etc. They are for the most part superficial, and rarely attain the depth and severity of the bedsore that occur in acute myelitis and cerebral hæmorrhage. They are not spontaneous, being always induced by pressure, and may to a certain extent be prevented by placing the patients in more suitable beds, and diligently attending to their neatness and cleanness.

{ Pneumonia occurs frequently, and in an insidious manner. It is often limited to a small part of the lung, and if the patient appears no worse than usual, it may escape observation ; but it is recognised in accurate and methodical percussion of the chest, which will then reveal a larger or smaller area of dulness or a relatively tympanitic area in the posterior region of the thorax, and often over the base of the lungs. On auscultation, great difficulties are experienced in judging the actual state of the lungs, owing to the indeterminate character of the vesicular murmur habitual in paralytics, and owing to the loud muscular noises in the patients. Bronchial breathing is

rare, as are also the crepitant râles of croupous pneumonia. More frequently we find râles of medium coarseness, scattered or grouped together with a timbre not metallic. Sometimes a noise closely resembling that produced by the compression of a doughy mass in the closed hand is heard; it is almost characteristic of this form of pneumonia. Cough and dyspnœa are often absent; sometimes there is expectoration.

This form of pneumonia may be produced experimentally by section of the vagus (Frey, Traube, Bianchi), and undoubtedly coincides with the degeneration of the pneumogastric nerves demonstrated by myself. Many factors play a part in its genesis and development, but in every case it is produced by the same micro-organism as occurs in croupous pneumonia (Fraenkel's diplococcus), which would not exert its pathogenic action except after section or degeneration of the vagus—that is to say, when the soil has been made favourable either by an altered chemistry or a weakening of the mechanism of defence, in consequence of diminished or suppressed action of the vagus and its centres. This, after a considerable number of observations and experiments, was demonstrated by myself (Bianchi, '*La pulmonite dei paralitici*,' *La Psichiatria*, etc., 1896), and subsequently by Piccinino, who carried out investigations in my clinique.

Furuncles are not uncommon; in one case I had to incise as many as eighteen. Sometimes multiple and even symmetrical lipomata have been observed (Targowla).

The thermogenesis is anomalous. Methodical observations carried out on a considerable number of paralytics show a great difference in behaviour of the temperature in different cases—a fact that cannot yet be satisfactorily explained.

There are cases in which the axillary temperature remains normal; in others, hyperpyrexia or hypopyrexia prevails; or the temperature remains normal or subnormal for some hours or several days, then rises at other hours or on other days without any apparent reason. Pneumonia, bedsores, meningo-encephalitis, intestinal auto-intoxications, and those toxæmias due to functional insufficiency of the liver, kidneys, and suprarenal capsules, are amongst the causes that have been offered in explanation of these irregular elevations.

The alterations of the tissue metabolism which have claimed the attention of clinicians bear some relation to the changes of temperature. Among the findings are diminution of the chlorides (Leubuscher), increase of the phosphates (Marro), diminution of the specific gravity of the blood and of the hæmoglobin (Vorster), peptonuria (Marro, Fronda), and also a volatile phosphorous compound, basic and resembling aconitine (Selmi). Acetonuria is not uncommon (Rivano). According to Lailler, the elimination of the products of regressive metamorphosis would be diminished in the

depressed state, and increased in the state of sorrowful agitation. Phosphoric acid does not appear to be increased in the urine. Diabetes is very rare, but not albuminuria. Vassale and Chiossi found hyaline and granular tube-casts in nine cases of progressive paralysis, and they attribute this to the alteration in the constitution of the blood produced by toxic agents. Polyuria is rather frequent (Falret, Turner).

Galante has often found hyperpepsia coinciding with the phases of exaltation and well-being, and hypopepsia with the phenomena of depression.

The *congestive attacks*, which in some cases are first to appear upon the scene, occur episodically in the confirmed malady. They vary in degree.

1. If there is a simple congestive flux to the head, the face is injected, the veins of the forehead and the neck are more evident and turgid, the excitability is more marked, the consciousness more confused, the speech slower and more uncertain, and the temperature elevated by a few decimals.

2. To these somatic and psychic symptoms there is added in some cases a lively motor agitation, with shouting and more or less violent delirium, lasting from several hours to two or three days; it disappears gradually, leaving behind marked mental confusion, which in its turn diminishes, but does not entirely disappear.

3. In other cases we have, as in the apoplectiform attacks, loss of consciousness, gradual or sudden, down to profound coma. In this state the face is injected, the veins are turgid, the temporal arteries pulsate strongly; the pupils are rigid and often myotic; the temperature in the axilla sometimes rises to 40° C.; the skin is dry or covered with sweat; the pulse is full, and more or less rapid, muscular spasms are often observed in the face or neck and in the limbs; there is almost always conjugate deviation of the head and eyes; one or other side of the body is seen to be paralyzed; there is involuntary loss of urine and of fæces. Such a condition always disappears gradually in a few hours or days, leaving behind it mental confusion and hemiparesis or hemiplegia, which in most instances also disappears. These attacks are sometimes preceded by marked salivation—the result, perhaps, of stimulation of the cortical centre of the salivary glands (Féré).

The *paralytic* and *aphasic attacks* reveal themselves in paralysis localized in one side or in one limb only, or else in a general motor collapse, sometimes terminating fatally, and accompanied neither by marked congestive phenomena nor by convulsions or coma. In most cases the paresis or paralysis is transitory. In some cases the paralysis affects exclusively the function of language. It is in this way that those complex aphasic forms of which Ascher speaks, and which are often aphasic-dysarthritic, announce themselves and dominate the symptomatic picture. They are not accompanied by

evident signs of cerebral congestion. Sometimes they are due to lymphatic stasis, and in these cases we get an elevation instead of a lowering of the temperature.

The epileptiform attacks may, like the apoplectiform, precede the commencement of the disease for some time, and may even be frequently repeated at longer or shorter intervals in the course of the malady.

In the confirmed stage the Jacksonian and vertiginous forms are more frequent, especially the former, and also that form called eclampsic by some authors (Cullerre), which, however, does not merit a separate description. The epileptiform attack is generally of a tumultuous nature. Without any warning, or with some fleeting phenomena which escapes observation, the paralytic is seized with cramps, at first limited to one limb, but soon extending to other muscular fields. The consciousness is clouded. The patient mutters words quite unintelligible. Soon there are superadded conjugate deviation of the head and eyes, foaming at the mouth, congested face, dilated pupils, and profuse sweats. The temperature rises to 38.5° to 39° C. In rare instances, when the attack is very grave, so that coma supervenes and there is danger of collapse, it rises to 40° C. or more.

The duration of the attack varies from half an hour to many hours, or even several days. In the latter case, however, it soon loses its initial intensity. The consciousness becomes partly restored, so much so that the patient, when addressed in a loud voice, opens his eyes, or gives some sign that the stimulus has arrived at the threshold of perception. The temperature descends to some extent, but always remains above the normal. The cramps become limited to some groups of muscles. The conjugate deviation of the head and eyes often persists much longer.

The convulsion may remain circumscribed or it may change its seat. Intermissions and remissions may occur, and later on the attack may assume its former intensity. If it is prolonged and widespread, signs of collapse, a more marked elevation of the temperature, and a fatal issue may occur.

The apoplectiform and epileptiform accessions are less common in women.

With regard to the cause of these attacks, the very large number of autopsies on paralytics performed in the Naples Asylum, together with accurate clinical examination of many of them, do not favour the hypothesis either of a marked congestive flux or of an intense inflammatory process in any region of the brain. At the autopsy we may find an intense congestion, although there were no apoplectiform attacks during life. In other cases in which death was due to epileptiform attacks not only was there no sign of inflammatory adhesion of the pia mater to the cortex, the pia being detached with the greatest facility, but I could not find even any indication

of congestion either in the cortex or in the white substance. Adhesion of the cortex to the pia mater in the Rolandic region occurs less frequently than Tamburini and Riva would make out. On the other hand, I have often found lymphatic stasis even to the extent of cystic formations of the size of a hazel-nut in the frontal and Rolandic lymphatic channels, and I am led to regard this anatomical condition and the local poisoning arising from it as perhaps the most frequent causes of the said attacks. Furthermore, in a certain number of cases the attacks are decidedly uræmic. Capriati, who investigated this subject, found marked albuminuria, hyaline tube-casts, hæmaturia, and scantiness of urine in a paralytic who was struck down by a severe epileptiform attack that terminated fatally in twenty-four hours.

According to Bechterew, the pressure on the lymphatic vessels does not reveal itself by any symptom, so long as it is not equal to that in the carotid artery. When, however, modifications of the carotid pressure occur from any cause whatsoever, epileptiform accessions would take place owing to the local compression. I am of opinion that too great importance is attached to this compression, and too little to the hindered flow in the lymphatic vessels, which must induce very considerable disturbances of the nutritive interchange in the nerve-cells.

The *hysteroid attacks*, which are said to occur especially in women, owing to the known association of hysteria with organic diseases of the nervous system (A. Voisin), and the *tetanoid*, or, as Magnan calls them, *spinal attacks*, the genesis of which is to be referred to the variable localization of the morbid process in the spinal medulla, are very rare.

According to Seppilli and Riva, there exists a senile form of progressive paralysis having different anatomical features from the common form. These consist in true or dissecting aneurisms of the cerebral arteries, hyperplasia of the interstitial connective tissue, and diffuse atheroma. Its clinical features would be the atheromatous pulse, the rarity of the apoplectiform accessions, the lesser tendency to hyperpyrexia, and the absence of ambitious and expansive delirium.

Progressive paralysis in old persons is either true paralysis differing only in presenting characteristics of senility, or it is a dementia resulting from multiple foci of softening, with phenomena of aphasia and especially of aphemia.

Progressive paralysis in women presents no great difference. The details of the somatic phenomena, the course of the affection (Buccola), and the psychic manifestations, must be referred to the mental constitution of woman, in whom the mental decadence is more profound and more prompt, the delirium of grandeur less common and less paradoxical, whilst eroticism is more evident in the delirious manifestations.

Numerous observations have clearly shown me that no difference exists, in any stage of the disease, either in symptomatology or in course, between progressive paralysis arising from syphilis and that from any other cause.

From a clinical point of view, progressive paralysis is one single affection. There is nothing to warrant us admitting a dual nature.

Pathological Anatomy.—We have to deal with a degenerative process (according to others an inflammatory process), which at first is localized, but gradually invades the entire nervous system. The organs of the highest structure are profoundly altered by the progressive substitution of the specific elements by connective tissue.

In the cranial bones there are noted marked congestion of the diploe, hyperostosis, disappearance of the diploe, and hardening. The weight of the skull-cap is increased (Fraenkel). The dura mater is thickened, turbid, adherent here and there to the cranium, and encrusted with calcareous plaques, especially in the region of the falx. On the internal aspect false membranes are found, sometimes very thick, at other times very thin, more or less vascular, forming one or more pouches and sometimes a true hæmatoma of the dura mater (hypertrophic and hæmorrhagic pachymeningitis). In some cases we find in the subdural space a collection of blood, in others a certain quantity of serum. As a rule, the arachnoid is thickened, and is always more or less turbid. The opacity is most marked along the course of the sulci and median veins. Sometimes small pearly granulations are scattered over the external aspect, or here and there fibrinous products are found. It is always infiltrated with serum. The spinal portion of this membrane sometimes has scattered over it new formations of 1 to 5 millimetres in diameter, composed of cellular tissue infiltrated with calcareous salts (Voisin), or true bony productions (Tamburini). The lesions of the pia mater are analogous to those of the arachnoid. Here also we find thickening, opacity, hyperæmia or anæmia, fibrous layers or bony plaques, sometimes pus, in other instances hæmorrhage.

The meshes of the pia are dilated by an infiltration of fluid forming a kind of gelatinous cap on the convex surface of the brain, most marked in the anterior regions. It is sometimes adherent to the brain, especially over the frontal lobes and Broca's convolution (Tamburini, Riva, and Stenger), so that on attempting to detach it the underlying gray substance suffers laceration at the summit of the convolutions.

The cerebrum is found to be congested and marbled with vessels, sometimes ulcerated in certain convolutions (these are the parts where the cortex has remained attached to the pia mater), cedematous, pale, small, and hard. This depends on the period at which death occurs, and on the immediate cause of death. The convolutions are smaller

(Stenger and others), the sulci wider, the gray substance thinner, the white substance generally harder. The ventricular ependyma is thickened and scattered over with granulations; the ventricles are dilated and filled with fluid. On section, the white substance in some cases has presented notable dilatation of the perivascular spaces, producing an appearance resembling Gruyère cheese (Lockhart-Clarke, Golgi, Vassale). In other cases we find small destructive foci, especially softening, in the capsule (Zacher) or in the nuclei of the base or subcortical foci (personal observations). The vessels are seen to be distended and full of blood; they often become hard or deformed, and here and there are dilated and sclerosed, showing various kinds of degeneration—colloid, hyaline, waxy, fatty, atheromatous (Greiff, Dagonet, Mendel)—or incrustations of lime-salts in the vessel-walls, which sometimes are scattered over with aneurisms.

With the nuclear proliferation, more marked in certain points, there also coincides an abundant migration of white blood-corpuscles under the adventitia, which is also overloaded with nuclei of new formation. This gives rise to dilatation of the perivascular spaces, which on the one hand offers an impediment to the course of the lymph, and on the other leads to the formation of true cysts filled with lymphatic fluid, and exerting compression on some part of the cerebral surface. The hypothesis of the new formation of vessels in the cortical substance seems admissible (Lubimow, A. Voisin, Mirzejewski, Robertson).

The hyperplasia of the interstitial tissue generally commences, according to Meynert, in the deepest layer of the gray substance, thence spreading to the others. Nuclei and spider cells are found in great abundance; their number is in many cases enormously increased. It is in the frontal lobes that Mendel has found the spider cells to be most numerous, and also increased to three or four times their normal size. Bundles of connective tissue are seen on the thickened ventricular ependyma, while on the epithelial surface of the ventricles there are formed true granulations of variable size, to which has been given the name of papilliform fibromata, and the connective-tissue nature of which has been recognised by Magnan and Mirzejewski.

It is difficult to say whether the nuclear and leucocytic bodies described by authorities in the past correspond to the plasma-cells described more recently by Unna, Marschalko, and Vogt. These plasma-cells (*plasmazellen*) have altogether peculiar morphological characteristics—eccentric position of the nucleus, peripheral distribution of the protoplasm, and a clear zone in the centre of the cell-body. They are found, not only in general paralysis, but also in many processes of new formation (tuberculosis, lupus, leprosy, soft chancre, fungoid mycosis, etc.). A difference of opinion prevails as to the origin of these cells. Unna holds them to be derived from

the fixed cells of the connective tissue, whilst Marschalko regards them as former leucocytes, or, in other words, migrated and transformed lymphocytes. In the brain they are found in abundance in the adventitial spaces. Vogt distinguishes them clearly from the nuclei (lymphocytes), and regards the presence of these cells as pathognomonic of dementia paralytica. They are found in very large numbers around the bloodvessels, especially in the lymphatic and adventitial spaces, whence they may sometimes migrate (Vogt). It is to be noted that Mahaim disputes the pathognomonic value attributed to the plasma-cells in progressive paralysis, and assigns the highest significance to the vascular lesions and to the lymphatic infiltration (*Bull. de l'Académie R. de Belgique*, 1901).

They are much more plentiful in the anterior part of the brain than in the occipital region. This seems to depend on the different structure of the convolutions (not excluding the supposition that it depends rather on the different functional dignity of the cortical provinces) and also on the period of development of the paralytic process, the plasma-cells being more numerous where the process is acute and recent.

This view supports the theory of the inflammatory nature of dementia paralytica.

In addition to plasma-cells, numerous *mastzellen* are found.

The nerve-elements undergo a series of alterations. At first the contour of the cell is more irregular and less clearly defined (Awtowkratow); the protoplasm becomes swollen, œdematous, and turbid, and afterwards undergoes atrophy and degeneration, varying in degree and kind—fatty, pigmentary, fatty-granular, hyaline (Liebmann, Dagonet). The nuclei are at first displaced, and are no longer round, as in the healthy cell, but irregular, enlarged (Mendel, Butzelsky), and lose their contour; the nucleoli also disappear, and at the same time the protoplasm is seen to be atrophied and to contain vacuoles. The pericellular lymphatic spaces are enlarged owing to the diminution of the protoplasmic mass, and in the majority of cases lymphatic corpuscles collect there. Here and there we come across sclerosis of the cells.

The accompanying illustration shows a group of cortical cells which present various stages of the degenerative process, consisting in the partial disappearance of the neurofibrillar network (R. y Cajal's method of staining).

Sometimes very little is left of the cell-protoplasm; it is broken in pieces, in some cases reduced to detritus, whilst in others it is diminished, vacuolated, and deformed without being broken. In the first case the nucleus is preserved, and survives the disappearance of the protoplasm; in the second case it is altered, and not readily distinguished from the protoplasm (Grimaldi, *Annali di Neurologia*, 1897). The nerve-prolongations also present alterations, swellings, varicosity, hypertrophy of the axis-cylinder, fatty-granular degeneration of the

medullary sheath of the myelinated fibres, sclerosis of the axis-cylinder (Pick), and entire disappearance of the nerve-prolongation, so that in a short time the cells lose their relations with the periphery or with the other cells. Tuczeck found a marked diminution in the number of medullated nerve-fibres in certain parts of the brain, especially the tangential fibres of the granular layer. This was confirmed by the investigations of Greppin, Kronthal, and Zacher. The disappearance of medullated fibres may take place in determined sites, or follow the direction of certain commissural paths

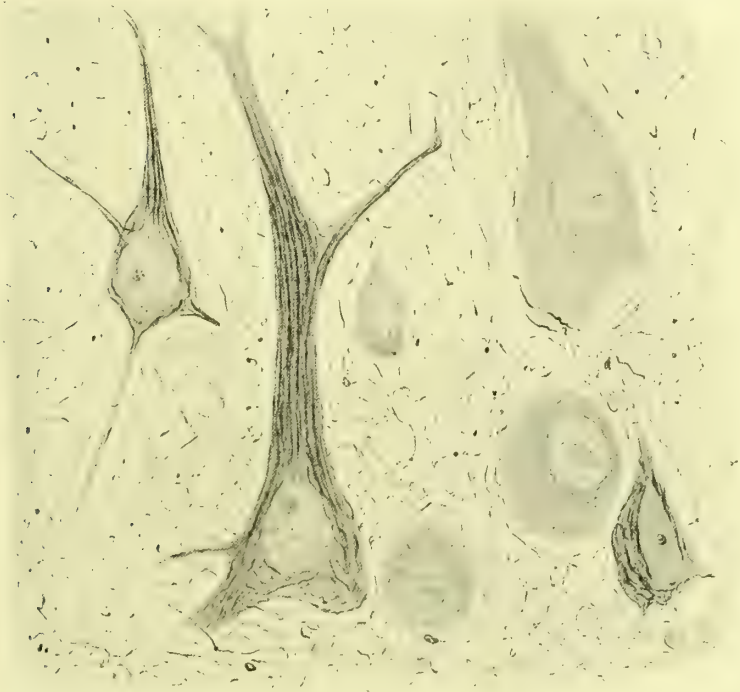


FIG. 99.—FROM THE ANTERIOR ROLANDIC CONVOLUTION (CAJAL'S METHOD ; MAGNIFIED 500 DIAMETERS).

The fibrillar apparatus is variously altered in the different cell-elements : in some it is more or less diminished, in others it has disappeared entirely.

(Tuczeck, Meschede). Amyloid or colloid bodies are found in the localities where the number of nerve-fibres is most reduced.

Tremors, some forms of defective articulation, abolition of the tendon-reflex in some cases, and pneumonia, may be attributed to lesions of the peripheral nerves (Bianchi).

Lissauer has found lesions in the optic thalamus. An important feature is that the thalamic lesions would appear to be related in some way with the paralytic attacks, for of nine cases in which these attacks had occurred, several presented lesions in the thalamus. The same degenerative lesions were studied by Zagari in cases in Mendel's clinique, and in these also paralytic attacks had taken place.

Hoche found degeneration of the anterior and posterior roots entirely independent of the usual degenerative lesions of the posterior columns and anterior cornua.

Atrophy of the nerve-fibres of the cerebellum is frequent.

Schutz found marked lesions in the nuclei of the hypoglossal and facial nerves, whilst he could demonstrate no change in the nuclei of the oculo-motor nerve. In paralytics in whom there had existed rigidity of the pupils, he found, in the region of the third ventricle and at the superior extremity of the aqueduct of Sylvius, a marked diminution of the nerve-fibres; in those cases, on the contrary, where there had been no pupillary rigidity these fibres were normal.

The histological alterations found in the spinal cord of paralytics are no less important than those found in the brain. Some of the lesions are systematized, others are diffuse. The most frequent is degeneration of the column of Burdach, or of a part of it, such as the zone of entrance of the posterior root (Westphal, Fornario, Sanna Salaris, etc.), especially in those cases in which there had existed evident signs of tabes—*e.g.*, abolition of the patellar reflex. The degeneration of the pyramidal bundle may be primary, or it may be a descending degeneration resulting from a profound destructive process in the cortical motor zone. Sometimes the degeneration is diffuse or in irregular islands, following no system of bundles. Degeneration of the column of Goll is very rare. The cells of the spinal medulla are less altered than those of the brain, but there, too, we find the same histological changes. Again, a central lesion of the spinal cord is common. The central canal is filled with nuclei, and there is also a considerable increase of these for some distance in the surrounding zones. Here and there the central canal is dilated, as though by necrotic destruction of a particular mass of nuclei or by peri-ependymar excavation, giving rise to an appearance closely resembling syringomyelia. These dilatations of the central canal are irregular (D' Abundo).

The posterior roots, the sympathetic ganglia (Bennet and Poincaré), the ganglia of the posterior roots (Piccolomini, Orr, and Rows), and the peripheral nerves—not only the cutaneous branches of these in the neighbourhood of bedsores (Dejerine), but the whole nerves—are attacked by the degenerative process. This degeneration is parenchymatous, and is independent of the state of the respective cells of origin, both in the spinal cord and in the bulb.

The degenerative process in progressive paralysis is not limited entirely to the nervous system. In advanced stages of the disease all the other organs are more or less involved in the same process, and present profound alterations. The heart is diminished in weight, pale, soft, and fatty. Hypertrophic dilatation of the heart, atheroma, and ulceration of the aorta are not uncommon. The lungs almost always show hypostasis, congestion, œdema, purulent

bronchitis, gangrene, old or recent tubercular nodules, emphysema, induration, recent pleurisy or old-standing pleuritic adhesions, hydrothorax, etc. The most frequent of these lesions is pneumonia, which has, as already noted, clinical characteristics of its own, and presents anatomo-pathological features, which, if not characteristic of progressive paralysis, yet occurs so frequently in that disease as to justify the term of pneumonia of paralytics.

Amongst the diseases of the abdominal viscera, marked dilatation of the stomach is common. It follows upon chronic intestinal catarrh, sometimes with slate-coloration of the mucous membrane.

The liver is congested, or very pale, or of nutmeg appearance. Sometimes there is slight cirrhosis, at other times perihepatitis, adhesions, and thickening of the capsule. Degeneration of the hepatic cells with increase of the connective tissue is common (Robertson). Unpublished researches carried out in my clinique strongly confirm these facts.

The spleen is small, hard, sometimes soft, or there is perisplenetic thickening of the capsule, which often contains fibroid plaques.

Renal lesions are very common, and there is no doubt that they must play an important part in the symptomatology of progressive paralysis. Mickle found the granular kidney in 18 per cent. of his paralytics. The percentage in the Naples clinique is much higher, and, further, there have been noted adherent capsule, cystic formations, acute or subacute parenchymatous nephritis (the latter in 14 per cent.), congestion, anæmia, suppuration, and sometimes pyelitis.

Acute or chronic cystitis is also frequently found, with simple hypertrophy of the prostate and hypertrophy of the bladder walls, which may attain a thickness exceeding 2 centimetres, leading to almost complete disappearance of the cavity (D' Abundo).

According to Mendel and others, progressive paralysis is a disease which commences in the vessel-walls, and is essentially a slow inflammatory process. For proof of this he points to Greppin's case, in which no lesions of the nerve-fibres were discovered, and to Friedmann's case, in which the nervous lesions were not at all proportionate to those of the vessel-walls, which were very pronounced. Experiments were carried out with the express object of detecting the anatomo-pathological process underlying progressive paralysis at its beginning. These consisted of the production of repeated cerebral congestions by placing animals (dogs) on a turn-table, with the head towards the periphery and the posterior quarter towards the central axis, so that, by imparting a swift rotatory movement to the table a state of congestion was provoked by centrifugal force. Mendel by this method succeeded in demonstrating a great abundance of nuclei on the vessel-walls, dilatation of the adventitial spaces, accumulation of nuclei within the spaces, but no alterations either in the white bundles or in the

cells. Mendel's views are shared by many others, including Gerdes, who produced progressive paralysis experimentally in dogs, and found the most conspicuous changes to consist of thickening of the intima and muscular coat of the arteries, and marked migration of nuclei. Bevan Lewis maintains that the inflammatory process commences with a proliferation of the cells of the adventitia, more intense in the external layers of the gray substance.

According to Stanziale (unpublished researches carried out in my clinique), the most profound alterations are found in the vessels in the form of endarteritis and periarteritis, and these alterations are indicative of the syphilitic origin of the malady.

Although this doctrine is supported by facts of great value, such as those referred to above, it nevertheless meets with considerable opposition. Zacher, for example, found a marked degree of atrophy of the nerve-fibres, and very few vascular lesions in two cases where death occurred four and eight weeks from the commencement. My researches and those of D'Abundo and Colella have confirmed the existence of parenchymatous degeneration of the peripheral nerves independent of the vascular lesions. Awtowkratow has carried out very minute investigations into the alterations of the cells in the nuclei of the medulla oblongata. His results resemble in the main those found by Mirzejewski, Mendel, Lubimow, and Butzelsky in the cells of the cortex, not only when there were marked vascular lesions, but where the vessels were simply dilated—that is to say, the degeneration of these cells is parenchymatous and primary.

Hermanides (*Les affections parasymphilitiques*, Haarlem, 1903) has attempted to reconcile the two doctrines by suggesting that in true progressive paralysis the lesions commence in the nerve-elements, whilst the syphilitic pseudo-paralysis always depends upon an arteritis. No proof has been given of this doctrine, which has also been advanced by Strümpell and Monakow. The question must still be regarded as an open one.

No less important is the indication of the localization of the process by means of the succession of symptoms. Here considerable value is to be attached to the investigations of Luys and Tuczeck, as well as to those of Binswanger, who found alteration or disappearance of the fibres of the external layer of the convolutions, especially in the frontal lobe and in the insula.

The different localization of the process and its different intensity in the various cortical zones or in the spinal cord explain the initial differences in symptomatology, as remarked by Schäfer, and are related to the innate predisposition, and to the different measure and dignity of work in the various cerebral provinces in different men.

The rapid mental decay of paralytics must depend more on lesions of the cells and of the commissural bundles than on vascular

lesions. Whole bundles of nerves disappear through degeneration and reabsorption, as though by a process of digestion (Lubimow).

Ætiology.—It is very well known that Fournier at first regarded progressive paralysis to be syphilitic in genesis, and later on of a parasyphilitic nature. All are not agreed on this point. This dispute has presented many phases, and has been productive of a great variety of statistics.

The first period is characterized by the hypothesis that progressive paralysis is of syphilitic origin and nature. This doctrine aroused, especially in France and Germany, the hopes and dreams that mercurial treatment might prove of service in combating this inexorable disease. The second period is characterized by the stimulation to a more accurate observation of the facts. The dream of the mercurial cure of progressive paralysis commences to be dissipated. It is not the syphilitic virus that determines the process underlying progressive paralysis, but the toxins that arise secondarily, following the penetration of the syphilitic virus into the organism (Strümpell's parasyphilis). We might call this the parasyphilitic period. The third period is the present, resembling the former in general lines, but manifesting a certain air of scepticism with regard to the still undemonstrated and altogether hypothetical toxins.

Even recent statistics show the same contradictory features as from the very outset have characterized this question. They show an extremely varying percentage in syphilitic origin, ranging from no less than 11 per cent. to 94 per cent.

Greidenberg (*'Zur Statistik und Aetiologie der allgemeinen progressiven Paralyse der Irren,' Neurologisches Centralbl., 1897*) has found syphilis alone in 36 per cent. of his cases, in combination with other causes in 62.6 per cent. In comparison with this percentage of paralytics of syphilitic origin, we have alcohol figuring alone in 14.3 per cent., combined with other causes in 40 per cent.; heredity alone in 4.7 per cent., combined in 20.8 per cent.; moral troubles alone in 8.7 per cent., combined in 9 per cent.; traumata alone in 4.3 per cent., combined in 5.2 per cent.

Of 287 paralytics confined in the Hudson River State Hospital, Peterson found only 55 with certain previous syphilis; but, as he could not exclude it with certainty in a certain number of patients, he has raised his figure to 60 per cent.

He found syphilis 7.1 per cent. times more frequent in progressive paralysis than in the other psychoses; but as in 30.1 per cent. of these patients neither hereditary nor acquired syphilis could be demonstrated, he concluded that syphilis is to be regarded as a frequent but not constant ætiological factor of progressive paralysis, and that this disease is not specific, but arises from the action of various ætiological agents, preferably in individuals whose

constitution has been weakened by a previous syphilitic infection.

Amongst 227 paralytics (193 men and 34 women) Knudt found syphilis positive in only 16 men, probable in other 8—that is to say, in 12·7 per cent. The proportion was less in the women, in only 3 of whom was it certain, and in 2 probable—that is to say, in 11 per cent. Again, alcohol was the exclusive cause in 15 men, while in 41 it was combined with other ætiological factors. On the other hand, hereditary taint was found in 30 per cent. of the men and 50 per cent. of the women.

With these examples I have sought to prove that even in the most recent times the contradictory character of the statistics has not been corrected, and allows of no sure conclusion being drawn from them, when we reflect that the percentage of syphilitics ranges from 21·6 per cent. (Obersteiner) to 42 per cent. (Cullerre), 48·1 per cent. to 92·6 per cent. (Urquhart), 51 per cent. (Jastrovitz), 64 per cent. (Cristiani), 74 per cent. (Mendel), 77·7 per cent. to 96·6 per cent. (Carbini), 88 per cent. (Minor), 76·7 per cent. (Kowalewski), 94 per cent. (Regis).

One can understand how, by introducing the doubtful cases which go to increase the numbers of true and probable syphilitics we are merely generalizing, drawing argument from the uniformity of the clinical picture. Thus, at the Psychiatric Congress held in Vienna a few years ago, Hirsch arrived at the very strange conclusion that, as progressive paralysis always presents itself in a well-recognisable clinical picture, and, on the whole, shows a uniformity with regard to the multiplicity of the presumed causes, and since in some cases we can trace the syphilitic genesis, we ought therefore to conclude that to the uniformity of the clinical picture there is a corresponding unity of genesis which cannot be other than syphilitic in every case.

I also present a few statistics. I have thought it advisable to deal only with those cases in which it was possible to obtain a very detailed account, especially of the previous history. The number of such clinical histories has been 87. In this number, syphilis has been found only 47 times. It must be noted that syphilis is almost always accompanied by other causes, so that, were we to judge the individual cases very strictly, we would find syphilis alone in very rare instances. In the 87 cases, in fact, syphilis has only 12 times been the exclusive cause, while in 35 it has been found in combination with other causes—a fact that greatly detracts from the value of the hypothesis of the syphilitic genesis of the disease. It is important to note that very often I have met with the abuse of alcohol, neuro-psychopathic heredity, and venereal excesses.

The results of my statistics are grouped in the following table :

	Total Number of Cases in which Pre-sent.	As Sole Cause.	Along with Other Causes.	Observations.
Heredity	48	17	31	Five times in women
Syphilis	47	12	35	
Alcohol	26	2	24	
Sexual excesses	14	—	14	
Mental worry	9	1	8	
Previous psychopathy	3	—	3	
Previous neuropathy	4	1	3	
Malnutrition	5	—	5	
Trauma	1	—	1	
Isolation	1	—	1	
Chronic intestinal disturbances	3	—	3	
Tobacco	2	—	2	
Acute infective diseases	5	—	5	

With regard to the abuse of alcohol, a very accurate investigation carried out quite recently has shown that its importance is far from insignificant even in the central provinces of Italy. In 26 out of 87 cases, indeed, I have been able to verify the abuse of alcoholic drinks, a fact which agrees with the observations made by Seppilli and his assistant Dr. Lui in the asylum at Brescia (*Annali di Neurologia*, 1900).

This is also in agreement with the views of other observers, such as Mendel (*Die Progressive Paralyse der Irren*); Greidenberg, who places alcohol after syphilis, in the proportion of 14·3 per cent. as the exclusive cause, and 40 per cent. combined with other causes; Van Deventer ('*Twee gevallen van Dementia Paralytica*,' etc., *Psych. en Neurol. Bladen*, 1898), who places the abuse of alcoholic liquors in the first rank; Knudt, who amongst 193 paralytics found alcohol as an exclusive cause of the malady in 15 cases, and combined with other ætiological factors in 41 cases; Funaioli, and very many others.

We cannot fail to recognise, then, in the abuse of alcoholic drinks a genetic agent of progressive paralysis almost equal in power to syphilis.

It has been affirmed by many authors that this malady is the least hereditary of the psychopathies, and that it develops under the influence of causes that act on the individual independently of hereditary predisposition; but both accurate examination of the literature of the subject and direct observation bring into evidence the fact that heredity is much more frequent than is generally supposed. Amongst 87 cases, heredity figures 17 times as the sole cause of the disease, and 48 times combined with other causes. Whilst syphilis is found alone in 12 cases, heredity occurs alone in 17; this demonstrates the value of hereditary taint.

I leave unprejudiced the question whether hereditary syphilis

plays any great part in these cases, as held by many of the French school.

Heredity figures to a small extent in the statistics of Greidenberg and of Westphal (*'Aetiologisches und symptomatologisches zur Lehre von der Prog. Par. der Irren.,' Neurolog. Centralb., 1894*). In the former we find it as an exclusive cause in 4.7 per cent., and along with other causes 20.8 per cent.; in the latter the percentage is 5.4 per cent.

In an accurate statistical study of 238 patients in the Sainte Anne clinique, Ameline found that heredity, of one or other degree (double, single, partial, alcoholic, and vesanic or similar), may be regarded as present without doubt in half the cases (*'De l'hérédité et en particulier de l'hérédité similaire dans la paralysie générale,' Ann. Méd. Psych., 1899*). It serves but little purpose to take up the question whether the children of paralytics are liable to progressive paralysis, nor can we regard it as a fruitful subject of discussion, as has been carried on by Arnaud, Briand, Charpentier, Joffroy, and Christian (*'À propos de la descendance des paralytiques généraux,' Ann. Méd. Psych., 1899*). In this respect progressive paralysis behaves like all other mental and nervous affections.

That heredity exercises a great pathogenic influence is also confirmed by the observations of Naecke, who assigns a preponderating influence to heredity and degeneration in the development of progressive paralysis (*'Dementia Paralytica und Degeneration,' Neurolog. Centralb., 1898-1900*).

Further, progressive paralysis from heredity is closely related with apoplexy in the genitors. In the collection of 87 cases, it was found that at least in 10 instances the genitors were hemiplegic or had died from apoplexy. The heredity was strongest where both parents had suffered from paralysis, no matter whether due to thrombosis or to cerebral hæmorrhage. In these cases it is not a mere coincidence that we have to deal with, as Stoddart subtly suggested apropos of cases of paralytics whose parents had both been paralytic, or else one paralytic and the other tabetic.

Again, it is to be noted that the apoplectic or apoplectiform attacks in paralytics, especially at the commencement of the disease, as not infrequently occurs, are sometimes connected with the presence of renal disease. Bristowe has put on record his observations of 75 cases of progressive paralysis, in 60 of which he found nephritis. I can add, in confirmation of Bristowe's observations, that renal lesions are frequently found at the autopsies made in the Naples Asylum. Albumin is frequently present in the urine, and the kidneys are generally found to be small and atrophied. In 20 recent autopsies the kidneys presented more or less profound changes in 13 instances.

In many cases of paralysis in which the disease has commenced with an apoplectiform attack, the examination of the urine has

revealed the presence of a marked degree of nephritis. In some of these cases the patients had shown no sign of the malady before the apoplectiform (uræmic ?) attack.

These observations apply both to syphilitic subjects and to those in whom we can absolutely exclude syphilis.

If alongside the relationship traced between apoplexy in the genitors and progressive paralysis in the offspring we place that between nephritis and progressive paralysis, and also that between previous apoplexy and the later onset of progressive paralysis in the same individual, and if, at the bottom of this series of facts, we could recognise the arthritic diathesis which is regarded by the majority of pathologists as the cause of vascular alterations, we might more reasonably assign to the arthritic state a high pathogenic value.

Long ago I came to this conclusion, which I have seen confirmed in the excellent examination of the question made by Mairét and Vires ('*De la paralysie générale : Étiologie, pathogénie, traitement,*' 1898), who attribute great importance to the arthritic heredity, as set forth by Bouchard, and also to the alcoholic heredity, whilst they assign a rather low value to syphilis.

Previous simple psychoses act by preparing the soil for the development of progressive paralysis. There are patients who, years before, have suffered from an attack of melancholia, or, as more commonly happens, of mania. After an interval of five to eight years, the second attack takes the form of paralytic dementia. It would be impossible to predict that the first attack represents a prelude to the succeeding morbid picture. Again, there are cases of progressive paralysis that arise in the train of another uncured mental disorder. Amongst other cases, I remember a paranoiac who had been ten years in the asylum. She was a chronic patient, and only after this long duration of the primary affection did the symptomatic picture of progressive paralysis arise, the patient dying of the latter disease.

Another case was that of a syphilitic young man, suffering from a classic form of sensory insanity, followed by stupor, which lasted several months. Improvement had commenced, and the patient seemed well on the road to recovery, when suddenly the stupor ceased, a delirium of grandeur was set up, and a galloping form of progressive paralysis became established.

At the autopsy all the signs of progressive paralysis were found. The most probable theory is that the progressive paralysis did not arise as a disease by itself, but was a secondary development in a brain that had already undergone the pernicious effects of a preceding intoxication which had produced the primary hallucinatory psychosis.

Previous attacks of insanity, of any form whatsoever, disturb the nutritive processes in the nerve-cell which, immediately follow-

ing the psychosis or after a longer or shorter time, degenerates. Herein lies the explanation of the development of progressive paralysis after acute infective diseases (cases of Dalmar and others), including pellagra (Baillarger, Lombroso, and Pianetta, *La demencia paralytica nei pellagrosi*, 1900).

The same explanation must apply to those cases of juvenile progressive paralysis in which tuberculosis was the only discoverable antecedent (Marchand, Regis).

Strümpell and others have affirmed that progressive paralysis develops in the tertiary, and Joffroy in the quaternary, period. It would accordingly be included amongst the parasymphilitic affections. This is deduced from the fact that no syphilitic lesions are found at the autopsy, and from the negative therapeutic results, for it is now generally recognised that antisymphilitic remedies are of no service.

The hypothesis of the specificity of the parasymphilitic toxines (syphilotoxines of Strümpell and Moebius, indirect alexines of Finger, included by Tommasoli under the happy term of syphilism) in the genesis of progressive paralysis would be belied did there exist cases in which tabes dorsalis or progressive paralysis developed during the period of efflorescence of the secondary syphilis. Now, cases of this kind are, indeed, to be found in the literature of the subject, and I have myself observed several. At a recent congress in Limoges, Devay referred to such cases, and was supported by Ballet and Brissaud. These observers, however, have not been able to record a shorter interval than three years between the inoculation of the syphilitic virus and the onset of progressive paralysis. I can say with certainty that I have observed many cases in which it was impossible to speak of parasymphilis, but rather of syphilis, the disease having commenced only a few months after the contagion. Very often it happens that, during the antisymphilitic treatment, soon after the ulcer has healed, and sometimes even earlier, the patient complains of pains, which are mistaken for osteocopic pains, but are in reality the pseudo-neuralgic pains that indicate the commencement of tabes. Later on the phenomena of dementia paralytica enter upon the scene. These two syndromes cannot be regarded as distinct from one another; they constitute only one disease. There is, then, no doubt that the conditions that determine the development of progressive paralysis may be realized, not only in the tertiary and quaternary, but also in the secondary periods of syphilis.

There are cases in which the classic manifestations of tertiary syphilis exist along with progressive paralysis. By means, however, of the antisymphilitic remedies, the gummata and all the other manifestations of general syphilis disappear, and the progressive paralysis continues its fatal course without undergoing any modification from the more or less prolonged treatment.

All these facts lend greater probability to Hitzig's hypothesis, according to which other toxines sometimes act along with the syphilitic virus, modifying the state of the blood in some particular way, and predisposing to the degeneration of the nervous system.

It is to be added that, whilst nearly all prostitutes are syphilitic, progressive paralysis is very rare amongst them, while it is frequent in married women, syphilitic or not. This is a fact of the greatest significance, and it is confirmed by similar observations. Amongst 565 paralytic women, Idanow found only 83 prostitutes. Wollemberg and Westphal obtained very similar results. Wollemberg declares that the majority of paralytics are married, and that prostitution makes but a small contribution to their number. Siemerling also agrees with this.

Westphal was surprised to find that among 148 paralytics there was not a single prostitute. This is a point I remarked in 1887, apropos of the ætiology of tabes. From 1891 to 1898, Sanna Salaris observed only two paralytic women in the asylum at Cagliari, and it cannot be said that prostitution and syphilis do not exist in Sardinia.

Progressive paralysis sometimes develops before syphilis. Cases have been reported where paralytics have been discharged from the asylum during a period of remission, and have contracted syphilis (Greidenberg). It may be objected that syphilis is capable of being inoculated a second time, but such facts at least counter-balance the results of Krafft-Ebing's experiments, which, though certainly very bold, are yet not very demonstrative. Krafft-Ebing inoculated paralytics with syphilitic virus, but found them immune, and argued accordingly that all those paralytics were already syphilized, forgetting to take into account the fact that immunity to syphilis is very frequent.

It is well to add that there is no clinical difference between syphilitic, alcoholic, and other non-syphilitic paralytics. At any rate, amongst many hundreds of paralytics I have never been able to establish any. Differences in the symptomatic picture do not depend upon differences in the causes that have determined the disease. All distinctions made up till now have been artificial. The groups of hereditary paralysis, syphilitic paralysis, and alcoholic paralysis all present the same mode of commencement and the same course. That syphilis is one of the causes of progressive paralysis admits of no doubt, but we cannot consent to the hypothesis that it is the specific pathogenic factor. The abuse of alcohol, the arthritic diathesis, heredity, sexual excesses, mental worry, sun-stroke, moral sufferings, and injuries to the head, are able to determine the same degenerative process in the nerve-elements or the vessel-walls, especially when congenital weakness of the nervous system is present. In all this there is nothing specific.

Its biochemical orientation and activity being altered, the

nerve-element is less capable of defence, and dies earlier in the ordinary course of life. It is no longer able to take up the quantity of nourishment necessary for its existence, and, above all, to promptly eliminate the products of its disintegration, but remains in a condition of katabolism.

Nor are we even in a position to invoke for progressive paralysis the facts that have been specially brought forward in recent times in the case of *tabes dorsalis*. We know that, to strengthen the notion of pseudo-*tabes*, there have been recorded cases diagnosed as *tabes dorsalis*, in which, at the autopsy, a specific meningitis, with formation of gummatous nodules, has been found, in addition to the lesions, systematized or not, of the posterior columns. These are the cases of Kuh, Ewald, Dinkler, Marinesco, Eisenlohr, Oppenheim, Brusch, and others. Now, the leptomeningitis, and sometimes the pachymeningitis, that are almost constantly found at the autopsy of paralytics hardly ever present the characters of syphilitic meningitis and gummatous nodules.

Progressive paralysis, then, is not a specific disease like tuberculosis, syphilis, or small-pox, but may be provoked by a large number of causes. Syphilis, alcohol, heredity, moral or physical injury, sexual abuse, apoplexy, nephritis, and previous mental affections, all prepare a particular biochemical (toxic) condition, which lowers the nutritive energy of the nerve-elements, and favours the final victory of the connective elements.

Thus only can we explain the complex uniformity of the clinical figure and the pathological anatomy of the paralysis, until new facts are discovered showing that all these causes do not prepare the soil for a single intoxication, microbic or otherwise. Robertson (with MacRae and Jeffrey), has carried out important researches bearing upon this question ('Bacteriological Investigations into the Pathology of General Paralysis of the Insane,' *Review of Neurology and Psychiatry*, 1903). This distinguished observer found the Klebs-Löffler bacillus of diphtheria so often and in such abundance in the digestive and respiratory apparatus, and even in the brain (in four out of sixteen paralytics), that he could not deny that it had a high value in the pathogenesis of general paralysis. The conclusion to be drawn is that the power of resistance to the attacks of this micro-organism is lowered by the action of syphilis, alcohol, and all other alleged causes of general paralysis. We hope that the interesting facts brought to light by Robertson may be confirmed, and that a more legitimate field for the therapy of this disease may thus be opened.

Ethnic conditions, so closely connected as they are with the mode of living, must not escape examination in the question of the genesis of progressive paralysis. Much light, in fact, may be derived from this examination. It cannot be disputed, judging from the reports of Lowes, Henger, and Meillon, that progressive

paralysis is rare among the Arabs and amongst Mussulmans in general; rare also in Servia, in Southern Russia, in some districts of Scotland, and in Ireland (Macpherson). The same remark may also be applied to Switzerland. There is no doubt that syphilis is rare in the cold regions, such as Iceland, only four cases having been observed in eight years by Schieberck, the principal medical officer of that region, while at the same time progressive paralysis is very rare, that officer having observed only one case; but it is to be remembered that syphilis is very frequent in Japan, whilst general paralysis is rare (2 per cent. in the Tokio Asylum a few years ago). We must add that it is rare also in Abyssinia. Now, if this is true, although it is disputed by Ballet, who throws out the suspicion that progressive paralysis is not so very rare amongst the Arabs, the doctrine of the specific genesis of progressive paralysis cannot be held to be assured, for, as is well known, syphilis is quite common and very severe amongst those peoples. Even Bukley, cited by Cullerre, attributes the progressive paralysis observed amongst negroes to the rapid change in mode of living of the negro race, which, formerly exempted from the preoccupations of daily life, now finds itself engaged alongside civilized races in the struggle for existence. E. Stoddart holds general paralysis to be essentially a disease of civilization, and affirms that it is practically unknown among the uncivilized nations of the world. One would like to know of what civilization Stoddart means to speak. In the province of Naples, not more civilized than Turin, the paralytics are in the average proportion of 30 per cent. of the men sent to the asylum.

Diagnosis.—An accurate examination of a paralytic allows us to recognise progressive paralysis with certainty when the disease is confirmed, and to distinguish it from all other psychopathies and organic diseases of the brain.

It is distinguished from cerebral syphilis by the fact that in syphilis of the brain the somatic phenomena are more limited and better defined (ocular paralysis, hemiplegia, very intense but limited cephalalgia, neuralgia of the trigeminus, with atrophy and disappearance of the temporal muscles, associate paralysis of the external rectus, crossed paralysis), while the psychic phenomena are but slightly marked or entirely absent. In the few cases in which there is a diffuse gummatous formation along the course of the arteries, syphilis assumes all the characteristics of dementia paralytica (Hugues). In these very rare cases the differential diagnosis is impossible. The difficulties are somewhat increased in the first stage of the disease, and in this matter I share the pre-occupation of Folsom and others; but even in this stage accurate examination of the behaviour of the patient, especially when we are dealing with a well-organized individual of high intellectual



development, who presents phenomena of mental decadence, generally succeeds in overcoming them.

I have never been able to find a place for pseudo-paralysis amongst my convictions, and I must declare that amongst a very large number of observations of progressive paralysis I have never come across any of the so-called pseudo-paralyses. I therefore hold syphilitic pseudo-paralysis to be simply a clinical variety.

Progressive paralysis, be it of alcoholic or syphilitic origin, admits of no transitions; such can happen only when we are dealing with any other process that is erroneously and dangerously confounded with progressive paralysis. It always preserves its own significance, being in no way modified by the 'pseudo' of the lovers of lights and shades. It always shows the same want of response to treatment, and is almost always fatal.

Some observers state that delirium of grandeur is absent in cerebral syphilis—that is to say, in the so-called paralysis from end- and peri- arteritis. This is true only in the case of cerebral syphilis with symptoms of foci, not in the form characterized by endarteritis.

Schüle, Ziehen, and Krafft-Ebing have attributed great importance to the universal character of the psychic disturbance in true general paralysis, in which, they maintain, the dementia is most characteristic, whilst in pseudo-paralysis we have rather a defect in logic and an arrest of thought (Ziehen), along with somnolence, apathy, and hallucinatory accessions, which disappear and give place to mental lucidity.

In progressive paralysis we find factors that are observed in all chronic mental affections—forms of rapid and forms of slow development, complete forms and rudimentary and abortive forms, just as in tuberculosis, syphilis, tabes, etc. All this does not justify us in establishing the varieties of pseudo-paralysis. At the most we may speak of mild and abortive (rare) forms.

Given the onset of the disease with one of the syndromes described, and given the slightest disorder of speech articulation, which sometimes can only be detected with the greatest difficulty, we must make the diagnosis of general paralysis, no matter what the form assumed or the cause that gives rise to it. I have previously mentioned how the excitement and delirium of mania cannot be mistaken for the excitement and delirium of progressive paralysis.

The delirium of grandeur of progressive paralysis, is distinguished from that of parancia of pride, in which, amongst other characteristics, the reasoning power is preserved for a long time, and somatic phenomena are definitely absent. This same feature will serve to distinguish progressive paralysis from melancholia and circular insanity, whilst an accurate psychic examination will always bring to light the element 'dementia,' which is not found in melan-

cholia nor in circular insanity, except they have been of long duration. In these affections articulatory disturbances of speech are always absent.

Nor can it be confounded with the stuporous state of melancholia, hallucinatory stupor, or dementia præcox, when one bears in mind the almost exclusive somatic phenomena of progressive paralysis. Tremor is met with in some rare cases of dementia præcox, but it is very different from that of dementia paralytica. Mutism, negativism, and mannerisms are exceedingly rare phenomena in dementia paralytica. Articulatory disturbances are almost always wanting in dementia præcox. Any confusion is due to an error in diagnosis.

From alcoholic encephalopathy it is distinguished not only by the traces of acute toxic delirium, but also by the fact that what we get in this case is not so much dementia as intellectual dulness, which, instead of being progressive as in progressive paralysis, tends to disappear. The disturbances of motility in the alcoholic encephalopathy are ataxic or spasmodic in nature, and arise tumultuously. Those of dementia paralytica are paralytic in nature, and slowly progressive.

Hallucinations and disturbance of general sensation are more frequent in alcoholism than in paralytic dementia. Muscular atrophy depending upon neuritis favours the diagnosis of alcoholic cerebropathy (alcoholic paralytiform insanity of Grimaldi).

From the saturnine encephalopathy it is distinguished by the general features of lead-poisoning, which, just as it may give rise to forms very similar to tabes (Stieglitz, Pal, De Renzi, Monakow), also produces a true progressive paralysis which cannot be distinguished either by its clinical picture or by its course and issue (Maran on di Montyel, Mendel, Gowers).

I have experienced real difficulty in two cases of hysteria, which may sometimes simulate the gravest spinal diseases, and even progressive paralysis.

The *course* of progressive paralysis varies greatly. There are cases that run an acute course, terminating in a few weeks or months, or a subacute course, lasting a year or little more. Again, there are cases whose entire development involves a period of ten years or longer. Between these two extremes there are many degrees of duration. This great variety in the course depends partly on the intensity of the intoxication and the site chosen by the disease, and partly on the resistance of the individual. Above all, there are episodes, sometimes fatal—acute delirium, apoplectiform and epileptiform attacks—which not only give a particular stamp to the disease, but shorten its duration.

A galloping course depends on causes that cannot always be determined. Whether we have the intervention of special infec-

tions, or intoxications arising from absorption of abnormal intestinal products, or the presence of new products of an altered tissue metabolism arising from hepatic or other glandular insufficiency, are points that further researches will probably elucidate at no distant date.

We may have in the course of progressive paralysis periods of improvement, during which almost all the somatic and psychic disturbances disappear, sometimes to such an extent as to simulate recovery. There always remains a certain degree of depression of the various mental activities, but on the whole there is established a condition that is generally satisfactory and very like recovery.

The psychic and somatic symptoms do not show a parallel improvement. Sometimes the latter persist, whilst the intelligence seems to have reacquired its former vigour; at other times both psychic and somatic symptoms ameliorate, but in most cases a certain degree of mental enfeeblement may be recognised.

Some observations go to prove that remission in paralytics may even exceed our expectations; the psychic personality becomes restored. A professor of music confined in the Sales Asylum with the most classic form of progressive paralysis was discharged after some months, so much improved that he was able to lead the orchestra of the Teatro Mercadante. There remained only a certain slowness of thought and speech, and a slight depression of the tone of the psychic personality, bordering on childishness.

Another man, who amongst other disorders showed such a profound alteration of the kinæsthesia that he confidently threw himself from the window of his house because, he said, he felt so light that he seemed able to fly, was discharged from the asylum as cured, owing to the complete disappearance of the psychic and somatic phenomena—tremors, inequality of the pupils, defective articulation, etc. I might have published this case as a rare example of recovery, but this error was prevented by the patient returning to the asylum about a year later, with the same clinical picture as before; this time, however, the malady proceeded to a fatal issue.

Remissions are more frequent and even more promising in the maniacal form of paralysis, and more so at the beginning of the disease than at an advanced stage; very rarely, however, are they so complete as in the case to which I have referred. The lucid intervals of the circular form of progressive paralysis described by Fabre and others have little or nothing in common with the remissions in question. These remissions sometimes last two (Baillarger), and even three years (Legrand de Saulle); this, according to my experience, is a very rare occurrence.

Doutrebente's and Lasègue's cases of remission, lasting twenty-five years, are at least worthy of mention, but the same hesitancy is here to be observed as in the cases of recovery of Voisin and Schüle. Although such statements are guaranteed by persons of authority,

I must confess that, excluding those remissions so closely resembling recovery, I have never observed a true case of recovery, notwithstanding the numerous methods of treatment I have tried. Nor can I associate myself with the statements of Morel, Falret, and Dautreberte to the effect that progressive paralysis in hereditary cases may last even twenty-five years. In this respect I share the opinion of Marandon di Montyel. The longest duration I have observed in any case has been thirteen years. The average duration is from three to five years, the fatal issue being due to apoplectiform and epileptiform attacks, chronic diarrhœa, purulent cystitis, septicæmia caused by bedsores, pneumonia, general marasmus, etc.

The *prognosis* is decidedly unfavourable. Even when, by accurate clinical inquiry, the disease can be detected at its very commencement, the experienced clinician can indulge no hope of recovery. In private practice we meet with cases of incipient paralysis in which the first symptoms, very indefinite, disturb the consciousness of the patient, or are noticed by an observant family, and in these cases the most favourable and rational conditions in which the patient can be placed can at most only hinder the ulterior development of the disease, which in every instance pursues an unrelenting course. No doubt there is a prodromal period during which the efforts of the physician might bear fruit, and which may last many months, or even a year or so (in the neurasthenic forms); but it is almost impossible to recognise the true nature of the prodromal symptoms—*e.g.*, exaggerated affective excitability, a certain degree of loss of memory and incapacity for attention, insomnia, headache, disturbances of the sexual sphere (exaggerated excitability or impotence), new tendencies, such as for alcohol, etc., all of which phenomena are not at all characteristic of, or peculiar to, progressive paralysis.

Therapy.—I would like to share the hopes—certainly not supported by careful investigation—of some authors, who hold that progressive paralysis is curable at its commencement, on the ground that we have then to deal with simple congestion, which Brunet asserts he has very successfully combated with the tartrate of antimony in doses up to a gramme, and with bromide of potassium up to 40 grammes (!) per day. Most unfortunately, these statements are not justified by facts.

Notwithstanding, the efforts of the conscientious clinician, who by early recognition of the malady is able to hinder its development, may be beneficial, if not in saving the patient, at least in preventing the reckless and certain dissipation of fortunes, sometimes colossal, and in protecting the patient's family and others from moral and material injuries. Mental rest, by withdrawing the patient from his accustomed stimuli and usual environment, and at the same time

preventing in the most suitable way the carrying out of his grandiose enterprises, is the first and most important indication.

From the very outset the exalted paralytic must be put under control and strictest supervision. Fortunately, in fulfilling this task the physician meets with fewer difficulties than in other mental conditions, owing to the fact that the paralytic, treated with consideration and tact, is easily controlled. It is a good rule not to delay sending him to an asylum, and this applies particularly to patients of the first group. Preference is to be shown for those asylums which have large grounds, thus enabling patients to be much in the open air and to be occupied in rural pursuits.

In addition to the tranquillity of his surroundings and the avoidance of those emotions to which business life, and sometimes even family life, expose him, it is advantageous to have him employed during the day in some agreeable occupation, and it is necessary to give him good nourishment, eliminating from his diet anything that may possibly prove too stimulating.

When he is separated from his family and removed from his wonted environment, kindly, authoritative, and intelligent behaviour on the part of the physician almost always induces in the mind of the paralytic that calm which is vainly sought by the use of bromides and other common depressants.

We have now to take up the question whether or not we ought to place the paralytic under mercurial treatment. Whatever other clinicians may think, and despite the vast accumulation of the results of antisypilitic treatment, I express to-day, after a long and not happy personal experience, with frankness equal to the certainty with which I declare it, my opinion that mercurial treatment does not lend itself to any useful result, and sometimes even is dangerous.

Not one of the patients treated carefully with hypodermic injections of sublimate or with mercurial inunctions derived any conspicuous and lasting benefit therefrom ; many of them who had the misfortune to fall into the hands of unscrupulous and ignorant members of the profession, and who underwent as many as 200, and even more, hypodermic mercurial injections, became worse.

The improvement of the few was slight and fleeting, and benefit could not be attributed to the mercury any more than to the suitable and favourable conditions in which the patients had been placed.

Along with Professor Penta, I employed intravenous injections of sublimate (Bacelli's method) in those cases where syphilis had been positively demonstrated ; but I was compelled to admit, from the rapid aggravation of all the symptoms of the disease, that it was right and proper to discontinue.

Paralytics have come to me who, after having been in the hands of syphilographers, and having at the commencement of the disease undergone a long course of mercurial treatment (100 and more injections of sublimate), had become worse. I am of opinion that

it is now necessary to persuade all practitioners that mercurial treatment is more often hurtful than useful, and that at most the clinician free from preconceptions may employ it conscientiously and prudently within judicious limits, suspending it by degrees.

During the past year I have entrusted to Professor Stanziale, a well-known and esteemed syphilographer who has been carrying out interesting researches in the Naples Asylum, a large number of patients, some of them quite recent, for rigorous treatment with injections of calomel. No conspicuous advantage has followed.

All the most recent data of recovery, such as the four cases of Leduc and the six of Lemoine, do not shatter my convictions ; and the results of the intensive method above recorded dispelled the enthusiasm I derived from Leredde's book (*La nature syphilitique et la curabilité du tabes et de la paralysie générale*, 1903).

That potassium iodide exerts a modifying action on the inflammatory process or on the arterial sclerosis remains yet to be proved. In several cases it appeared to me to have a certain effect, inasmuch as I succeeded in obtaining with it a significant and prolonged amelioration.

Counter-irritants to the head, the seton, repeated igneo-puncture of the neck and head, antimonial ointments, iodine applications (Pritchard, Davies), and vesicants have proved of advantage. I have almost always employed the last, as they are well tolerated, and, being easy of application, are very useful in private houses, whilst the antimonial ointment and the cautery excite paralytics, often making them intolerant and irritable.

Hydrotherapy, in the form of the douche, is almost always hurtful. I have, however, found serviceable baths between 28° and 32° C., according to the degree of excitement of the patient, along with a mild cold douche to the head ; but I have by no means found the enthusiasm of Voisin justified. Moderate applications of alternate heat and cold on the abdomen, foot-baths in congested states of the head, ice-bags, or the frontal douche by itself, render some modest service in the treatment.

Ergot is the least deceptive remedy in the congestive states that are almost always present in progressive paralysis. The dose may be pushed to a few grammes of ergotin daily for two or three months, without causing constipation or other phenomena of ergotism (Girma). It may be substituted by injections of ergotin (Christian). I have preferred the liquid extract of ergot up to 40 drops daily, and with this have obtained satisfactory results in the habitual congestive states and the apoplectiform attacks ; recently I have used hypodermic injections of stypticin.

In patients with pallid features and failing nutrition, we may add the use of quinine and tonics. Strychnine, phosphorus, and especially the strychnate of iron, prove hurtful.

The double chloride of gold and sodium has been lauded by Bom-

bila, Hadies, and Costa, in doses of from 2 milligrammes to 2 centigrammes daily. M. Frise and Regis have derived good results from suspension. The galvanic current has rendered no small service in the hands of others. Jendrassick has used with great advantage antifebrin in $\frac{1}{2}$ -gramme doses for the irritability of paralytics. Marro claims good results from the use of potassium cantharidinate, and to have observed true recoveries from long-provoked suppurations.

Injections of sodium glycono-phosphate, cerebrin, lecithin, and disodic methylarsenate are of assistance only in the prodromal neurasthenic stage.

Trephining has been proposed by Shaw, and has been practised also by B. Tüke, Wagner, and several others. This operation can have no other effect than that of relieving cerebral compression by draining off a part of the fluid collected in the subarachnoid spaces, and in the perivascular and distended lymphatic channels—a not uncommon cause of the epileptiform and paralytic accessions. Its effect, however, on the ulterior course of the malady can only be transitory.

The episodes of acute delirium and agitation, the numerous other disquieting and threatening symptoms, such as insomnia, sitophobia, retention of urine, paresis of the muscles of deglutition, bedsores, and visceral diseases, especially pneumonia and the various forms of catarrh of the digestive tract, are treated in paralytics on the lines indicated by general and special therapeutics.

A more rational attempt has recently been made by Robertson, who, in view of the pathogenic importance of the Klebs-Löffler bacillus, has introduced the use of serotherapy with the antidiphtheritic serum in progressive paralysis. The results thus far obtained by Robertson are not very encouraging. If we could prove this bacillus to be the sole toxic agent in the genesis of the affection, there is no doubt the use of antitoxin would have good results; but meanwhile we can only praise the rationality of the attempt, which should be imitated and encouraged.

CHAPTER XXXI

LUETIC DEMENTIA

THE title of luetic dementia is justified by the fact that the psychoses arising, not from simple intoxication, but from the syphilitic process, always present, amongst various other manifestations, a *deficit*, due to the fact that wherever there is a syphilitic neoformation there is a disturbance or alteration of the nerve-elements, so that the psychic activity of the sufferer is diminished, either generally or partially.

The syphilitic process may be localized in a small part of the cerebral mantle, or it may extend over a larger area ; or, again, it may be restricted to the vessels. In all these cases the range and the gravity of the symptoms depend upon the extent and depth of the seat of the process. The syndromes, therefore, vary to an extreme degree.

Huebner, and many German authors after him, have distinguished three types of cerebral syphilis.

The first is represented by epileptiform attacks, often Jacksonian in character, by incomplete paralysis, more or less marked psychic disturbances, and terminal comatose states. The second variety is characterized by apoplectic or apoplectiform attacks, consecutive hemiplegia, psychic disturbances varying in degree and form, frequently by aphasia in one or other form, by paralysis of the cranial nerves, and often by attacks of somnolence. The third type presents phenomena of mental decadence and somatic facts which, taken as a whole, remind us of paralytic dementia.

While this distinction is convenient and furnishes points of guidance in the diagnosis, it must, however, be agreed that luetic dementia is not confined within the limits above indicated. The syndromes vary extremely, as might be expected from the variations in the seat and extent of the lesion. From simple cephalalgia, with progressive mental obtuseness, due to cranial periostitis and meningitis, up to hypochondriasis and sensory insanity resulting from a diffuse gummatous process, as in the case reported, there is a whole series of morbid pictures, varying extremely one from another,

although they can all be recognised from specific symptoms and from the history of the disease.

Other factors, however, intervene and complicate still more the web of facts, thus rendering the diagnosis more difficult. If around the thrombotic softening produced by syphilitic arteritis, or around the hæmorrhagic focus resulting from rupture of a degenerated artery, non-specific inflammatory processes be developed, and thereafter secondary degenerations, the relative manifestations present no particular features, but they obscure the syphilitic syndrome. Nevertheless, the result of treatment will make the matter clear, for all these complicating factors of secondary character obey the common law of non-curability.

With regard to dementia due to syphilitic arterio-sclerosis, the difficulties are increased still further, because, notwithstanding the investigations already made into this matter, we are not yet in a position to distinguish syphilitic arterio-sclerosis from the arthritic and alcoholic variety. The difficulty in distinguishing clearly the various origins of the arterio-sclerosis has induced some authors to speak of a general paralysis that is syphilitic, and another form that is non-syphilitic. It is not for me to treat this subject at length here, and I say only that neither the mode of onset, the symptomatic complexus, the course, nor the result of the disease, will justify such a distinction.

Fournier distinguishes six initial forms of cerebral syphilis—the cephalalgic, the congestive, the epileptic, the aphasic, the mental, and the paralytic.

According to my observations, the cephalalgic variety is really characteristic. It begins with pains in the head, which gradually become violent, heavy, or acute, at first localized in one region of the cranium, but afterwards extending and affecting the whole of the head. The pain becomes more severe towards evening and during the night; it allows no rest, deprives the patient of sleep, and sometimes causes vomiting. It increases with pressure on the cranium at certain points, and is aggravated by percussion. It is not rare to find a certain cedematous pastiness of the scalp, just where pressure or percussion cannot be borne.

When the pain becomes worse, sometimes causing the patient to cry out, a change of character is generally noted; and while the affective excitability increases, the mental force diminishes, so that we find phenomena of real mental obtuseness. There is slowness of all the psychic processes, particularly slowness and insufficiency of memory. There are terrifying dreams in the brief intervals of sleep, and generally a condition half melancholic and half stupid. Sometimes there are hallucinations and deliria.

This syndrome, of long duration if the diagnosis be not made in time, and if treatment is resorted to only at a late stage, may finally become associated with factors of convulsion and paralysis.

The epileptic or Jacksonian convulsions and the paralysis depend upon the cortical or basal field, where the syphilitic process is localized or is most intense.

Notwithstanding all this, it appears evident that the distinction of the luetic forms as made by Fournier is in a certain way superfluous.

It should be remembered that the luetic encephalopathy above described becomes paralytic or congestive or convulsive, and that each of these forms is associated with very distinct symptoms belonging to the other. Fournier's distinction, however, has some points of truth. There are forms of cerebral syphilis that do not manifest themselves except by Jacksonian epilepsy, while other forms show a richness in paralytic phenomena of the muscles of the eye, intrinsic or extrinsic, and of certain cranial nerves, as well as of the limbs, frequently associated one with another in such a way as to furnish elements for diagnosis.

Amongst the varieties distinguished by Fournier, one that specially calls for our attention is the paralytic form, for the eminent French syphilographer (and many others along with him, as already noted) distinguishes a form of syphilitic general paralysis from typical and genuine paralysis. He desires to call the syphilitic paralysis 'pseudo-paralysis,' and he gives distinctive characteristics whereby this syphilitic encephalopathy can be distinguished from true progressive paralysis. Among the differential symptoms should be noted :

1. Absence or short duration of the delirium of grandeur. According to some authors, like Wille, it is always entirely wanting.

2. Absence or transitory presence of that feeling of euphoria, strength, and well-being that is so frequent in typical progressive paralysis.

3. Rarity of tremor, particularly in the tongue and lips.

4. Presence of ocular paralysis, and sometimes of hemiplegia.

5. An apoplectiform commencement, characterized by paralytic and aphasic attacks, favours pseudo-paralysis. In this case the mental disturbances are secondary, whilst in genuine paralysis the mental disturbances precede the somatic disorders.

The opinions expressed by Hermanides (*Les affections parasymphilitiques*, Haarlem, 1900) are almost identical with the above.

Our ideas in this respect are well known, and it is unnecessary to repeat them here. We are in a position to put observers on their guard against those distinctions that have not a strong basis of observation. True syphilitic encephalopathy very rarely, or perhaps never at all, presents the same clinical picture as paralytic dementia. When this appears, whatever be the nature of the morbid picture or the chronological order of the symptoms, we can speak only of progressive paralysis, and not of syphilitic encephalopathy, except in relation to the question already noted as to the syphilitic genesis of paralytic dementia. The more localized forms of cerebral

syphilis are comparatively frequent. Goldflamm pointed out many years ago that the most frequent cause of organic diseases of the nervous system in patients between twenty and forty years of age is syphilis. Gazel, Balzer, Ferner, Brasch, Muriac, and others, are of the same opinion.

The symptoms are distinguished as transitory and permanent. The former are very frequent, and among them there is a prevalence of ocular paralysis and aphasic attacks. Among the latter are to be noted paralysis of the limbs and mental deficiencies. These almost always exist in the former class also, and vary extremely in different cases, according to the seat, extent, intensity, and duration of the process.

Gajkiewicz (*Syphilis du système nerveux*, 1892) affirms that affections of the temporo-occipital and frontal lobes are less frequent than those of the motor zone, and to the lesions of the frontal lobe (gummata and specific meningitis) he attributes the psychic deficiencies observed in the course of cerebral syphilis—amnesia, want of attention, indifference, irritability, affective excitability, lack of energy, and susceptibility to suggestion.

In addition to these manifestations there are still graver syndromes, veritable acute psychopathies, such as attacks of mania or of confusion, with mental decadence, as well as the most varied syndromes due to destructive foci. I have twice observed, along with cephalalgia and mental obtuseness, hemiplegia in association with bilateral hemianopsia due to gummata of the optic thalamus and of the posterior part of the capsule.

According to some other authors, syphilitic pseudo-paralysis assumes three principal forms, referable to three different processes and three anatomical regions :

1. Meningeal gumma.
 2. Syphilitic meningitis, most frequently basal.
 3. Syphilitic arteritis, with thrombosis and consecutive softening.
- We may agree to accept this division of cerebral syphilis into three forms, but to give to the syndromes associated therewith the generic appellation of pseudo-paralysis is to cause confusion in the pathological and clinical pictures. It is clear that, when we have endo-periarteritis limited to some branch or terminal artery, with consequent thrombosis, the phenomena will be those of a cerebral malady due to a focus. On the other hand, when the arteritic process is diffuse, and there follows from it the degeneration of nervous elements, then the clinical form and the anatomo-pathological substratum are those of ordinary general paralysis. In both cases there is a mental deficit (dementia), but there is a great difference between the two clinical pictures.

We now come to the epileptic form of luetic dementia. This may be distinguished from ordinary inherited epilepsy by :

1. Its late origin, after the thirty-sixth year of life.

2. Its commencement in Jacksonian form, and its subsequent complication with other factors.

3. The rapid increase in the number of fits, very soon complicated with paralysis, aphasia, and mental deficiency (obnubilation of the mind).

4. The evidence of grave general syphilitic affection (pallor, enlarged glands).

5. The efficacy of energetic antisyphilitic treatment.

In addition to this form of direct epilepsy, Fournier has vigorously maintained that there exists a parasyphilitic and a hereditary form of epilepsy (inherited syphilitic epilepsy), and in this view he has been supported by Brissaud and Kowalewski.

This variety of epilepsy is perhaps in no way different from inherited alcoholic epilepsy.

We have here to deal with an intoxication produced by the toxins of syphilis, which act upon the nervous tissues, and disturb not only the general nutritive process of the foetal organism, but particularly that of the nervous system, impeding its complete evolution. It is possible, however, that other abnormal products may also be formed, and gain an entrance to the blood and lymph-streams, thus leading to modification of the chemical constitution of the tissues, and alteration of the nutritive exchanges, resulting in dystrophies of the nervous elements (cells and neuro-fibrils), and perhaps also of the neuroglia.

As will be observed, this doctrine is only a very probable hypothesis, and has not been demonstrated. The alterations that are found at the autopsy, alterations of the nerve-cells and rarefaction of the myelinic fibres, especially the tangential fibres, may well be accounted for by the duration of the disease. The same remarks may also be applied to *syphilitic hysteria*. Perhaps the grave forms of hysteria—hysterical hemiplegia, with great mental torpor—ought to suggest to us the possibility of syphilis.

Kowalewski (*Allgemeine Zeitsch. f. Psych.*, 1896) holds with Hermanides and others that syphilitic hysteria is much more frequent than is generally imagined, and that in hemiplegia associated with syphilitic hysteria the disturbances of sensibility are less accentuated (Achard), giving to this form the characteristics of organic hemiplegia.

The direct primary forms of epilepsy and of hysteria are more amenable to the influence of antisyphilitic treatment, whilst the hereditary forms, within certain limits, are subject only to symptomatic treatment.

For the pathological anatomy and the therapy I must refer readers to general and special treatises on syphilis.

CHAPTER XXXII

SENILE DEMENTIA

INSANITY does not spare old age. All the psychopathic forms of the second group find their representatives to a greater or less extent in advanced age. Most frequent of all are mania and melancholia ; less frequent are sensory, alcoholic, and luetic insanity. I have occasionally seen an aged morphinist and a patient who has become paranoic when advanced in years.

Epilepsy is not an uncommon accompaniment of old age, and is due to atheroma.

The progressive paralyses of the aged and the psychic alterations consequent upon destructive foci are treated in the respective chapters, and are, in my opinion, to be excluded from the study of true senile dementia.

The psychoses mentioned do not assume special forms in old age ; their clinical figure is preserved unaltered in its fundamental lines, except for some special character given to it by peculiarities of the mind of the aged person. These cases may end in recovery.

It is a matter of common knowledge that in old age the psychic processes are slower. Whether that be due to some obstacle in the transmission over the old and exhausted paths, or to the great increase in the number of psychic components accumulated in the memory in the course of a long experience, thus giving rise to greater difficulty in selection, and demanding more time for discrimination ; or, again, whether it be due to the slowing down of operations in the exhausted laboratories of thought in aged persons, a certain torpor can be noted in all the manifestations of psychic life, a tendency to repose, a certain lack of interest in all those matters that do not immediately concern the subject.

An air of melancholy invests the mind of the aged man, as he becomes conscious of the shortness of the time that remains to him in comparison with the period he has already lived.

The world of his youthful dreams and the aspirations of his adult age now suffers a constant diminution in his mind, whilst the world of experience and of reality stands before him and op-

presses his consciousness as with fear. The failing of his muscular strength, and above all the passing of the sexual life, fill the mind with an ill-dissimulated sadness, the only compensation being the experience of obstacles that have been overcome and the authority that attends such experience, and which the subject feels to the full. With mind less inclined to the pleasures of existence in proportion to the diminished vigour, he feels external stimuli less intensely than he did in the past, and becomes a pessimist in his judgment of present and modern matters, whilst the lively recollection of the days of joyful youth causes the subject to become a *laudator temporis acti*.

His defective energy makes him suspicious of the young, who press on, with their intense and abundant aspirations, to take his place, and so he becomes more circumspect and more austere, clinging all the more closely to everything that belongs to him, to that portion of the *ego* that we have termed 'mine,' the symbol of force and victory in the past, and the title that gives him the right to esteem and affection, and the dignity of a master. His possessions, his 'mine,' make up for the failing and passing *ego*.

The memory is weakened; recollection of recent names and facts is colourless and fugitive. Things are represented as vague shadows which the decaying old man cannot grasp. The power of evocation and of reproduction remains to the extent that the old man can evoke a great number of recollections, particularly of long-past events. The fact is that with him recent images are not formed in such a way as to be capable of easy re-evocation and reproduction. As Mercier well puts it, the defect lies in the 'formation of structural memories.' In this way the old man lives among images and recollections of the past. These are represented with fidelity and vivacity, and not interfered with by the colourless images of recent formation, so that it may readily be understood how he keeps before his mind mainly the events 'of his past.'

Such a defect in recent mental representations in the mind of the aged subject undergoing involution, is the cause of certain particular attitudes of mind, and even of real errors. If an old man of seventy marries a young woman of twenty, the reason is that he, although apparently sane, has a particular consciousness in whose field of vision predominate juvenile images and recollections that give him the illusion of power, although his actual power is absolutely inferior to the most elementary requirements of his new position. Two figures with opposite tendencies appear in these marriages, which are condemned alike by psychology and by morality. The young woman, knowing well what she does, marries the 'possessions' of the old man, and dreams of happiness with riches; whilst the old man, losing his contact with reality, declines more rapidly than before, relaxing his hold over his 'own.'

Another psychic feature frequent in senile mental decadence is

suspicion, and it is particularly marked in those who have accumulated a more or less considerable fortune, but have no direct heirs. In these cases the internal *ego* is attached more closely to the object possessed, as though from it there emanates a compensating force that gives animation and causes in the subject, as he regards the products of his activity, the illusion that he still possesses his old energy.

This psychological phenomenon becomes associated with another—viz., the suspicion that other persons are trying to deprive him of his ‘possessions,’ or that they look upon them with covetous eyes. This is the origin of the excessive care that he takes to hide his treasures, great or small. In the gravest cases he sometimes forgets the hiding-place, and breaks into mania, believing that he has been the victim of theft. Old men of this sort, whose powers have greatly decayed, become exacting, thankless, diffident, insensible, and egoistic. They insist rigidly on the hours for meals and for going to bed, and they do not share in any of the cares of their families. Even though the logical processes may appear to be, or may really be, unaffected, we have in such conduct the proof of mental involution.

Such subjects are often extremely emotional and irritable.

The organic functions assume a preponderating place in the tonality of senile life. Many old persons are preoccupied with the intestinal functions, and any retardation of these becomes for them a question of the highest interest. This extreme care that they take of their health assists, in neurasthenic and melancholic states of old age, in the formation of hypochondriacal deliria, which at such an age very often reach the maximum point of deliria of negation.

Such a totality of facts is found only in a few aged subjects, and the phenomena appear at very different ages. There are old men of sound mind who retain the fulness of their mental vigour until their last days, and there are men who become psychically old almost as soon as they reach maturity. The age of many is the age of their vessels, the degeneration of which is for the most part an index of senility. History is full of examples of old men who were mentally vigorous, just as our experience is full of men precociously aged. There is a wide intermediate zone, with all shades of morbidity.

When the above-mentioned psychic stigmata are present, but not highly accentuated, they impress their own particular character on the malady that supervenes; but still in such a case we cannot speak of true senile dementia: psychoses bearing the characteristics of senility may still be cured.

One variety appears to me to be very frequent and obstinate—namely, the anxious melancholia of those aged subjects who have enjoyed life much, or who have been much attached to mundane pleasures. The passing of their maturity plunges them into a state

of anguish during which they continually lament their endless sufferings, overmastered by a tormenting fear that they will not recover.

They have themselves frequently examined by doctors; they constantly repeat the same phrases, and are always talking of their sufferings and their anguish. The mental decay is slow, and shows itself first in the field of the affections. Such persons become extremely selfish, pretentious and overbearing in their families, whom they keep constantly busied with their sufferings. They become humble, childish, or even servile towards their medical advisers, from whom they still hope for remedies that will enable them to return to their old pleasures, the story of which has filled the greater part of their lives. The power of attention and memory gradually decay, until the stigmata of senile dementia become very apparent. Arterio-sclerosis, atheroma, and granular kidney are usually present.

Sometimes true senile dementia is preceded by an acute hallucinatory phase, at other times by facts which, for a longer or shorter period, give a false appearance of neurasthenia, and more rarely of one or other of the forms of melancholia or of mania. In most instances, however, the dementia is primary, and advances insidiously and slowly. In any case we always find defects of judgment and of memory, childish conduct, and general discontent, frequently rendering these patients querulous and petulant.

The varieties of senile dementia may be classed in two groups—those of erethistic and those of apathetic form. In the erethistic form there is great exaggeration of the emotivity, and hence it is why such patients are intolerant of impressions and of contradictions. They are extremely sensitive and irritable, and the more so because, owing to their great liability to forget things and to commit errors of judgment, they are deficient in the ordinary circumstances of family life. Such affective irritability is kept alive also by their sufferings—cephalalgia, vertigo, weariness, paræsthesia, and other subjective disorders. The nights are passed in sleeplessness, and oneiric states are frequent. The subjects are restless, and get out of bed. They wander about the house in a dazed condition; they cannot tell what they want, and they are quite out of their reckonings. They show great changeability of humour, sometimes even daily fits of confusion, and they suffer from hallucinatory episodes, with more or less marked agitation.

The apathetic form is characterized by a slow and progressive mental decadence, in which, besides the usual phenomena of amnesia and dysmnnesia, there prevails a marked indifference to everything and everybody. This picture corresponds with what is also normally found in certain old men, who behold with indifference the ruin of their households and the destruction of their families.

Patients belonging to this group enjoy good health, and are as

calm as they are vacant. They make no lamentations, and frequently are as satisfied and contented as the gods of Olympus.

A well-preserved and smiling old woman of seventy-eight, who remembers nothing, occupies herself with nothing, does no work, and is affected by nothing, will, if an opportunity arises during conversation, tell you that she would be very pleased to marry if she could find a husband, because she is well fitted to undertake the management of a house. Another will talk for a long time, mixing up places, persons, dates, events, speaking of people who have been long dead as still living, though she was much afflicted by their deaths, etc. As a rule, the most impressive episodes of their lives are mistaken for recent events, occurring, as it were, to-day, and

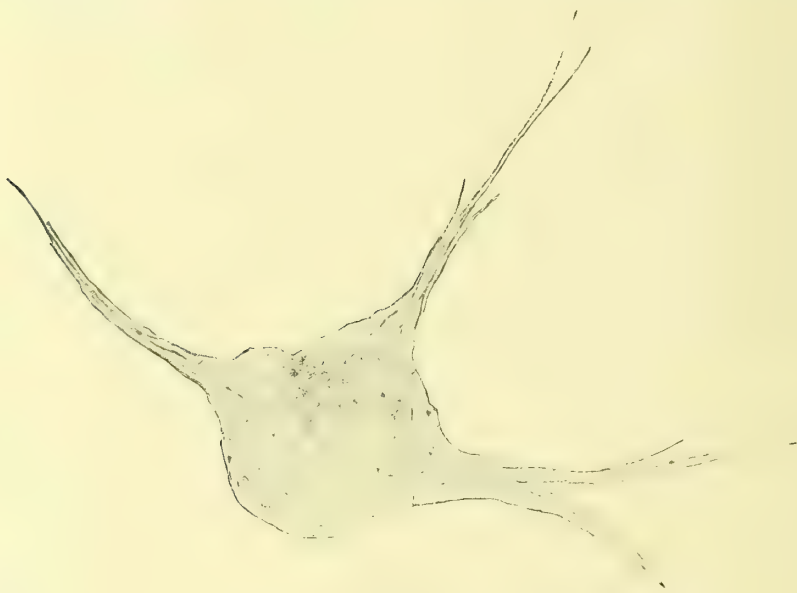


FIG. 100.—A CELL FROM THE ANTERIOR ROLANDIC CONVOLUTION (OCULAR, 8 ; OBJECTIVE, $\frac{1}{2}$; IMMERSION, K).

The endocellular reticular apparatus is sufficiently well preserved. At some parts of the cell the anastomosis of the fibrillæ is evident.

they rehearse the scenes, to a certain extent, with imaginary persons, making them occupy places other than those in which they actually occurred.

Again, patients belonging to this second group generally give much trouble to their families or to the asylum attendants during the night, for they have no idea where they are ; and if they meet with opposition, they cause a great uproar, scratching, yelling, and rushing about.

In both groups we may observe the disappearance of the higher mental powers in the inverse order of their appearance. The powers last developed are the first to disappear, and so on, until their whole life is circumscribed to the instinct of self-preservation.

When the malady proceeds slowly, the mental decay, if not far advanced, is concealed for a long time by gentlemanly or ladylike behaviour belonging to a remote past, the conduct thus followed and certain habits still retained forming a psychological automatism (the habit of reading and of meditating, and certain gentlemanly or ladylike attitudes, etc.).

The physical health of some of these demented subjects is well preserved for a long time, all their functions go on regularly, and they themselves feel quite well. It is only when the dementia has made great progress that the organic weakness becomes pronounced, showing itself in disturbances of digestion, bronchial troubles, renal mischief, attacks of congestion, and marasmus.

The somatic phenomena are not of much significance. Those described by some writers in the syndromes of the senile psychoses and of senile dementia belong to other clinical pictures. I do not speak of the somatic characteristics of senility, such as gray hairs, furrows, and the arcus senilis. None of the phenomena of paralytic or of post-apoplectic dementia are found in genuine senile dementia, except, in a few cases, senile tremor, very like Parkinson's tremor, extending to the lips and the lower jaw. Paralyzes of the most varied nature, hemiopia, and sensory disturbances, form part of the clinical picture of post-apoplectic dementia. Dysphasic disturbances reveal the presence of foci in determinate parts of the brain, and we have decisively separated the clinical manifestations of these from the clinical picture of senile dementia.

I have never found abolition of the tendinous reflex, nor dysarthria in senile dementia. The presence of either of these two phenomena, especially dysarthria, is a sign of progressive paralysis, which sometimes is developed at a late stage in the lives of old people.

One of the somatic phenomena sometimes episodically met with is catalepsy. Here we have to deal with attacks of catalepsy coinciding with states of stupor (Brissaud and Lamy, Duprè and Rabé, Bauer). As in acute dementia and hysteria, this phenomenon is associated with paralysis or with inhibition of the regulative powers. There is nothing particular to be noted after we have once brought this phenomenon into relation with the suppression of the higher cerebral powers, as in cases of confusion, somnambulism, etc.

Again, I have long observed a form of spastic paraparesis, well described by Pic of Lyons. After the investigations of Reverchon (*La Parésie spasmodique des Athéromateux*, 1902), this can now be attributed to lacunar foci of cerebral disintegration resulting from atheromatous degeneration of the cerebral arteries.

In addition to the acute psychoses to which the aged may, like other people, become subject, and which bear certain features attributable to the psychic orientation of the aged person, the senile dement, irrespective of degree of retrogression, may suffer from

acute vesanic attacks of confusion, with hallucinations and psychomotor agitation.

It not infrequently happens that a demented subject can give a fair account of himself at a first interview, for even though certain very distinct signs of his malady may appear, his answers are not without a certain order and a certain degree of knowledge ; but after a few days he may be found to be extremely confused, dazed, and incapable of giving his thoughts any precise direction. On close



FIG. 101.—CELL FROM THE ANTERIOR ROLANDIC CONVOLUTION (OCULAR, 8 ; OBJECTIVE, $\frac{1}{12}$; IMMERSION, K).

The fibrillæ are visible in some prolongations from which they extend to the perinuclear zone. They are absent from the remainder of the protoplasm.

examination, we perceive an acetonc odour in the breath, and may find serious intestinal disorders ; or, again, the renal functions may be very much reduced, and albumin and tube-casts present in the urine. Here we have the superaddition of infection or intoxication—a fact that has been brought out clearly by Ritti and by Regis.

Given the psychic deficiency of morbid senility, the most diverse forms of morbid conduct and of delirium are possible. Here, too, the pre-existing mental content and the moral orientation of each individual assume the highest importance.

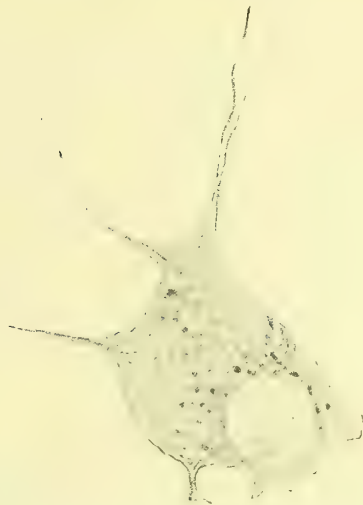


FIG. 102.—CELL FROM THE SECOND FRONTAL CONVOLUTION (OCULAR, 8;
OBJECTIVE, $\frac{1}{12}$; IMMERSION, K).

The endocellular apparatus is destroyed. In the body of the cell numerous globules of the so-called yellow globular degeneration may be observed.



FIG. 103.—CELL FROM THE SECOND OCCIPITAL CONVOLUTION (OCULAR, 8;
OBJECTIVE, $\frac{1}{12}$; IMMERSION, K).

In a great part of the cell the fibrillæ are not visible. One bundle can be observed (but even it does not present a normal aspect) passing from the apical into a basal prolongation.

For example, an old woman whose consciousness is filled with erotic aspirations and emotions will assume a coquettish air that is childish and ridiculous. A man of seventy-eight, hearing some words spoken jestingly by a young friend of the family, begins to suspect that the latter is intriguing with his wife, a woman of seventy-five. Shortly thereafter a real delirium of jealousy is organized, and some fine day he will waylay that friend of the family, and shoot him with a revolver. Such a case I have myself observed. In all these subjects there is a great defect of perception and of critical power ; and mental poverty, in every form and direction, appears clearly and incontestably to be the dominating note of all the mental manifestations.

Pathological Anatomy.—Senile dementia has a dystrophic substratum. In one category of cases there is a prevalence of atheromatous, vascular degeneration, associated with marked neuroglial proliferation ; while in another group the nerve-cells are involved in a true involutionary atrophic process, with various forms of degeneration, particularly the form characterized by pigmentary infiltration, already well described by Pierret and Troisier, by Marinesco (*Revue scientifique*, 1900), and by Bridier (*Thèse de Lyon*, 1902). The yellow degeneration described by Colucci is also frequent. With Ramon y Cajal's method, as applied by Fragnito, we can see that the fibrillar structure of the cell protoplasm is gravely affected.

In a case of advanced senile dementia the destruction of the neuro-fibrillæ appears, as shown in Figs. 100 to 104, to be much more extensive than in the brain of a paralytic subject.

The lesions of the nervous and protoplasmic prolongations are very similar to the alterations met with in paralytic dementia ; here also many nerve-fibres are found to be atrophied and degenerate. The neuroglia is everywhere more or less increased, but not to a very high degree. Foci of atrophic softening are frequent, especially in the white matter immediately below the cortex. These are generally extremely small, and are sometimes surrounded by sclerotic tissue.

Prognosis.—The prognosis of senile insanity is not absolutely grave.

Many cases, irrespective of form, end in recovery. Sometimes, however, the prognosis presents insuperable difficulties, because dysorientation is very apt to occur in an aged subject, and there are often phases of confusion, which sometimes resemble states of grave dementia, although they alternate with states of surprising lucidity. Such a succession of phases of confusion is related to the readier disturbances of the circulation and the lessened resistance offered by the nerve-cells that have already undergone involution.

It is different with cases of confirmed dementia, for there the prognosis is always hopeless. Senile dementia is slowly progressive.

Therapy.—The treatment consists solely in maintaining all the

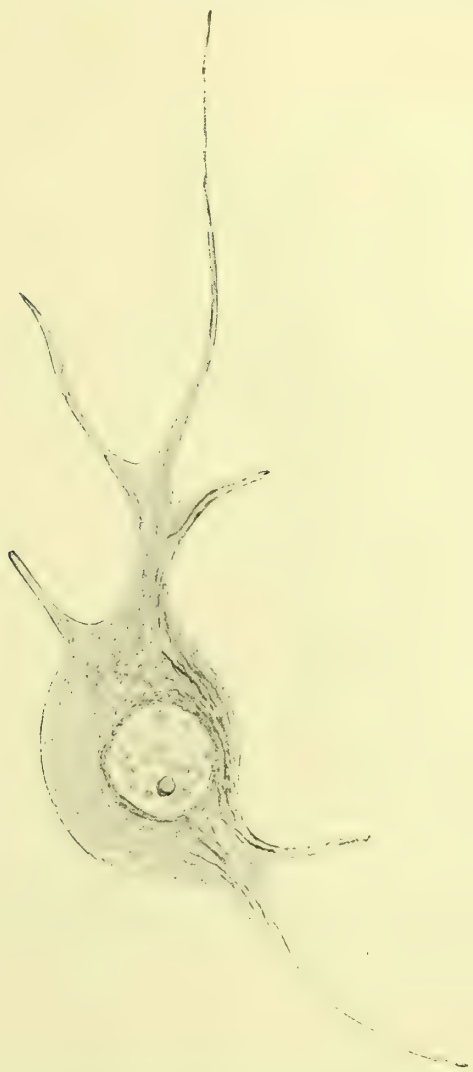


FIG. 104.—CELL FROM THE ANTERIOR ROLANDIC CONVOLUTION (OCULAR, 8 ; OBJECTIVE, $\frac{1}{12}$; IMMERSION, K), SHOWING MANY GLOBULES OF YELLOW GLOBULAR DEGENERATION AND SOME BROKEN FIBRILLÆ IN THE BODY OF THE CELL AND IN THE PROLONGATIONS.

organic functions in regular operation, especially those of the heart and the abdominal organs.

Special symptoms, such as insomnia, agitation, and anguish, must be treated on general lines.

CHAPTER XXXIII

POST-APOPLECTIC DEMENTIA

WERE I to try to describe all the psychic disturbances associated with hemiplegia and with destructive foci in general, and all the circumstances preceding, accompanying, or following the formation of cerebral foci, I should very much exceed the limits that I have thought well to lay down for this study. There is really no necessity to take into consideration all those mental affections in which the hæmorrhagic or thrombotic focus is simply an episode, however frequent it may be, as in the case of epilepsy, progressive paralysis, consecutive dementia, and other psychopathies. On the contrary, I must limit myself to the description of psychic disturbances belonging to the cerebral attack, and those that are the mediate or immediate consequence of the cerebral lesion itself.

Two classes of psychic disturbances must, therefore, be studied—the concomitant and the consecutive.

The first are those that accompany the apoplectic attack in the symptomatic complexus of which paralysis is frequently a predominant symptom, and they are reduced to the states of consciousness during coma or subcomatose conditions; or, again, to progressive restriction of the intellectual field, due to multiple foci, or to compression of the brain. The others follow the cerebral lesion, after the disappearance of all the acute phenomena of the cerebral attack.

The comatose state may be established suddenly or gradually. It may be most profound at the very commencement, and gradually disappear, ending in simple somnolence and the complete return of consciousness; or, on the other hand, it may begin with vertigo, confusion, dysorientation, simple obnubilation of the sensorium, and may more or less rapidly reach the grade of profound coma. In any case a characteristic feature of the trouble is its appearance when the patient is in the most satisfactory state of health, or is disturbed only by slight or insignificant premonitory symptoms.

In the latter case, even though there are grave premonitory

symptoms, such as recurring cephalalgia, vertigo, fumes and sense of fulness in the head, stunning sensation, and changes of humour, as a rule no great importance is attached to them by the sufferers before they fall victims to the attack of apoplexy. On the other hand, in the case of lesions of slow development, such as the neoplasm, or certain cases of cerebral thrombosis, there is usually observed a slow and progressive restriction of the mental field, with continuous weakening of the memory, greater or less psychic depression, great slowness in the processes of perception and reaction, somnolence and irritability, with diminished self-control. This state may go so far as abolition of all psychic activity in a deep sleep, which may be prolonged for days or weeks, until finally an apoplectic attack or state of epilepsy closes the scene. The subsequent psychic disturbances are most various, and require a still more detailed analysis. It is not always easy to interpret them, especially those caused by extremely circumscribed destructive foci. The intellectual faculties are not localized exclusively in any one part of the brain, for all the various provinces of which the brain is composed contribute in different degrees and in various ways to the constitution of the psychic organism, and to the explication of the activities of the mind. In the same way as a stroke of the brush or a touch of colour, either of them of no value in itself, may acquire great æsthetic value in the harmony of a painting, so contributions to mental efficacy and harmony may be made by the products of regions of the brain that apparently possess no real importance in the machinery of the psychic activities.

The fact, now almost generally accepted, that the brain is composed of units, which all concur with a coefficient of useful product of their own work, and of associative paths establishing communication between the divers units, or groups of units, adjacent or widely separated, through which alone the associated work and the complex product become possible, leads us to admit without discussion that any destructive focus whatsoever in the brain must have as an effect a diminution of the mental patrimony and the vigour of the personality in some direction or other.

This general fact is subject to few exceptions. The person who has a destructive focus in his brain must, psychically considered, be in some degree different from what he was prior to the attack of which hemiplegia is the sign, and in most cases the ineradicable sign. Men who were formerly active labourers, eager in the pursuit of their affairs and the care of their families, become in various degrees indifferent, apathetic, or indolent; and as though the source of their activities had dried up, the majority, if not all, of them are no longer in a position to form any proposition, or to translate it into action, when it requires a certain degree of energy or a special exercise of moral force. The fountains of imagination are exhausted, and the man who was noted for his bold proceedings

becomes indifferent or timid and undecided in the affairs of his everyday life and in matters relating to his own needs and those of his family ; or he becomes negligent of public concerns, to which he formerly devoted himself unceasingly and with great efficiency. Sometimes the ideative process is not at all inactive, but it does not attain the former degree of tonality and vivacity requisite for translation of the idea into action. Power of observation is frequently defective. Everything wears more fading and more evanescent colours. The memory is obscure and unreliable, this defect applying to words more than to events—and, among words, to nouns more than verbs ; among events, to recent happenings rather than the more remote. Speech becomes less vivacious, colourless, and halting, and it is difficult to maintain a long conversation. Weariness soon overtakes the speaker, and sometimes he falls asleep whilst actually speaking.

I myself have known politicians who, from their knowledge, their Parliamentary activity, their rapidity of conception and facility of speech, had acquired a leading position amongst the politicians of the country ; yet, after an attack of apoplexy, although they were apparently unharmed, and kept their seats in Parliament, they were silent members, or at the utmost they attempted some lobby intrigue, in which they were unsuccessful.

Such patients are tormented by cephalalgia, accompanied by a sense of weight, and often by vertigo ; sometimes they are overwhelmed by a feeling of anguish and of oppression, as though their end were near, so that they become sad, hypersensitive, and irritable. Their humour gradually becomes altered. For hemiplegic subjects the outer world has no longer a smile to cheer their spirits ; everything is in contrast to their own deplorable condition, and everything irritates and grieves them, so that they become suspicious and childish. They are easily moved, and some are very ready to fly into passions ; they become whimpering and irritable, like little children. The *ego* is harassed by the destroyed harmony of the parts, and, as though angry at the concord subsisting in the outer world, it turns upon itself, and between its fear of greater evil and its actual impotence, takes to contemplation of itself more than others, and the man who one day was generous and expansive becomes poor in spirit, preoccupied, egoistic, and often pretentious ; sentiments of affection for relatives and friends become more enfeebled in proportion as the regard for one's own person assumes greater consistency. Sometimes the sentiments are quite perverted. If to this be added false judgment, which may easily come about when family and social relations are looked upon from a morbidly egoistic point of view, there arise and assume consistency certain baseless sympathies and antipathies, quite irrational, yet capable of exercising very great influence upon the testamentary dispositions of those subjects of whom we are speaking. From

the ethical point of view, their conduct is not always irreproachable. In this respect also, bearing in mind their past, a more or less considerable deterioration is generally noticeable, and young and old, if not rendered impotent by paralysis, sometimes show themselves immoral or shameless. A certain young man suffering from hemiplegia was sent to the Naples Asylum, because, though formerly well-behaved, he had become quarrelsome, hasty, eccentric, imprudent, and even threatening towards his family, who lived in constant dread for some days prior to his admission. In the asylum he sought the company of criminals, whose disposition harmonized perfectly with his own.

This state of matters often becomes slowly and progressively worse. The perceptions become more and more torpid and incomplete, the judgments are substantially falsened, and the patients, who are forgetful and intolerably querulous, break out into cries, imprecations and insults over a trifle, falling into absolute fits of agitation, with loquacity, incoherence, heightened colour of the face, flashing eyes, and a tendency to violence. In such a case we may speak of effective post-apoplectic dementia, with or without agitation. The dementia sometimes reaches a high degree, the ideation is poor and ill-connected, and the memory extremely weakened. There may be deliria, and these are sometimes systematized.

In some cases hallucinations are developed, with all the train of phenomena accompanying the hallucinatory forms of psychosis—confusion, agitation, impulses or transitory states of stupor. It not infrequently happens that patients of this class are correct, clear, and fairly coherent during the day, whilst at night they are confused, out of their bearings, and incoherent, with a tendency to rise from bed and wander about the house in a dazed condition; or, where there are true oneiric states, to wander about the streets (Petersen).

The hallucinations may be episodic or of long duration. These patients furnish a certain contingent to the ranks of periodical insanity, in so far as phases of agitation and of exalted emotional states, with shouting and impulsiveness, follow one another periodically. The dementia is either stationary from the commencement or is slowly progressive. Sometimes it progresses up to a certain point, and then becomes stationary (Kraepelin).

Some hemiplegic subjects advance very rapidly in their dementia, when, as not rarely happens, the foci of softening are complicated with diabetes or chronic nephritis (intoxication), and when in old persons the arterio-sclerosis or the atheroma is considerably advanced. These patients become extremely stupid and filthy in their habits. There is almost always great mobility of emotion, laughter and tears being both very ready.

Destructive foci occurring in the brain during some period or other of youth, before the mental development is complete, prevent or misdirect further cerebral development.

I have never seen anyone who had become hemiplegic in childhood who did not show in adult age either more or less marked signs of imbecility or some striking anomalies of character. With respect to the psychic activities, it may be affirmed that destructive foci of the brain are the more insidious the younger the individual affected by them. If, as often happens, epilepsy follows upon apoplexy—an occurrence that is very frequent among the young, and is not at all rare among adults and old persons—then there may occur all those grave psychic anomalies that are so frequently met with in epilepsy, with this aggravation, that the effects are still more disastrous in the case of old people whose brains are damaged and weakened.

It is perfectly clear that in estimating such effects, we must take into account the functional rank of the units that have been suppressed and isolated, the regions that have been rendered inactive or involved in the trouble, the compensations, and the variations due to individual factors, in all of which we must seek the reason why it sometimes appears that no disorder or no lack of mental power results from lesions in certain cerebral regions, even though these be sometimes of notable extent, whilst very serious effects follow from lesions in other regions, and especially from lesions in the zone of language.

Post-apoplectic dementia is always accompanied by very distinct somatic phenomena ; among them we frequently find hemiplegia, monoplegia, disturbances of sensibility, hemianopsia, etc. (Bianchi, *La Emiplegia*, 1886 ; Marimu, *Annali di Neurologia*, 1904).

It is very difficult to explain the fact that small capsular lesions produce comatose states, whilst very much larger cortical foci, under similar conditions, do not give rise to coma ; nor is it easy to give any explanation of the mental decay, often very conspicuous, that is found to follow upon foci in the pons.

Certainly the interruption of a large projection bundle, like that of the internal capsule, must have a reflex effect on the whole of the cerebral hemisphere, whose functions we may consider as the physical basis of consciousness. On the other hand, the interruption, in the pons, of important associative paths between the two cerebral hemispheres, and between these and the cerebellum, must isolate and disarrange very extensive cortical regions of the two hemispheres, or even interfere with the whole cerebral function. Meanwhile, however, this explanation is not more than a hypothesis.

Foci in the zone of language are more hurtful to the intelligence than foci in any other region. Foci in the frontal lobes come next in importance.

Circumscribed foci of the occipital lobe frequently cause visual hallucinations. Foci causing irritation or interruption of the fibres that run through the anterior segment of the internal capsule give rise to spasmodic laughter or weeping, either because irritation of

these fibres puts in tension the centre of co-ordination for mimicry in the optic thalamus, or because interruption of them withdraws the centre of mimicry from the moderating and regulating influence of the cortex. The same result is obtained when the cortical centre of mimicry is destroyed (foot of the ascending frontal and of the ascending parietal convolutions). In this case, as in the preceding, the thalamic centre of mimicry is abandoned to the influence of all the peripheral stimuli, no regulative or inhibitory power being exercised upon it by the cortical centres of the face and the frontal lobe. Brissaud, and after him Mingazzini, maintained a similar doctrine, and up till the present it remains the most probable explanation.

Here it is necessary to add that anomalous stimulation of the thalamus through foci in its neighbourhood, or incorporated in its substance, may also give rise to extreme emotivity, with alternations of weeping and laughter. In two cases observed by me these phenomena had reached their highest degree. In one hemiplegia on the left was associated with hemianæsthesia (lesion of the posterior Rolandic zone, or of its projections into the corona radiata). In another, along with hemi-paresis on the right, there existed notable homonymous bilateral hemianopsia. In this case the focus would certainly be located either in the posterior part of the thalamus or in the thalamo-occipital paths.

Under similar conditions, lesions of the left hemisphere injure the intelligence much more than those of the right hemisphere. This difference is to be accounted for by the location of the function of language on the left.

It has been maintained that hæmorrhagic foci disturb the intelligence much less than softenings. Mingazzini has developed this thesis much more fully than any other writer, basing his idea on a notably large number of personal observations. As a rule, this is true, and I adopt the proposition thus enunciated, just as it has been implicitly assumed by Brissaud, Gowers, and others. The reasons for the difference in behaviour of the mind in subjects affected by hæmorrhage on the one hand, and those affected by cerebral softening on the other appear quite clear. The vascular anatomico-pathological substratum of cerebral hæmorrhage is found in the miliary aneurisms (Charcot and Bouchard); whilst softenings are due, on the other hand, to diffuse arterio-sclerosis, with all its consequences upon the nutrition of the brain.

Hæmorrhage is, comparatively speaking, more frequent at the period of life preceding old age, whilst softening is much more frequent in old age itself.

Softenings are frequently complicated, even to a greater extent than cerebral hæmorrhage, with diabetes and nephritis. Again, they are more frequent in the cortex, where hæmorrhage is comparatively rare. All these facts combined fully explain the frequency of

mental decay in cerebral softening as compared with cerebral hæmorrhage. This explanation is all the more convincing when we consider that in many cases mental decadence has already set in, simply through arterio-sclerosis or through senile cerebral involution, before the formation of the focus of softening ; and, further, the thrombotic attack which brings about softening is repeated much more frequently than hæmorrhage, and also at shorter intervals of time. It may therefore be legitimately concluded that it is not owing to the different nature of the destructive focus (hæmorrhage, thrombosis, embolism) that the intelligence of apoplectics is differently affected, but owing to the different vascular and cerebral conditions in which the destructive foci are produced, and also the number and site of these foci.

The pathological anatomy, the prognosis and the therapy of post-apoplectic dementia, are similar to those of destructive foci of the brain, and the general and vascular conditions in which these are produced, so that I must here refer readers to treatises on the diseases due to destructive foci in the brain.

CHAPTER XXXIV

APHASIC DEMENTIA

THE zone of language is so closely connected with the formation and the expression of thought that it may even be presumed *a priori* that a lesion at any point of this zone must necessarily have an effect upon the formation or the expression of thought.

Of the four sensory images which, apart from mimicry, prepare the spoken and written expression of thought—the auditory or phonetic, the visual, and the kinæsthetic images for both the spoken and the written word—the most preponderant, which regulates and governs the others, is the phonetic image, for the already-mentioned reason that, both phylogenetically and ontogenetically, it is the first to be developed, and carries on its functions more continuously and more intensely than the others, which are later in coming upon the scene, and perform their functions with more considerable interruptions. In only a single case does the visual image, and therefore the cortical area in which it has been formed, assume great importance—namely, when the art of reading, acquired in youth, has become a habit of life, and when, owing to certain particular conditions of heredity and environment, the verbal visual images have become numerous, and have been very frequently repeated, so that they appear more promptly and in the first rank in the reproductive process required for the expression of thought. Should this seem at first sight to be simply a hypothesis, on analysis it will be found to be sustained and proved by clear and incontestable facts. A case in point, and one of the most clearly demonstrative that the literature of the subject possesses, has been reported by myself, with necroscopic proofs

In the first part of this work (pp. 126 to 148) we have explained as succinctly as possible the main facts of the best founded doctrines on the subject of language.

We know that the majority of men speak by bringing into operation the double arc, low and high, F'A'A—F'G'G.

Few men speak with the visual system, V'A'A—V'G'G, and even in such a case, which occurs only in educated people, what

most frequently occurs is that the double system, auditory and visual, is put in motion, with a preponderance of one over the other, according to the more or less prolonged and vigorous exercise of the visual system. In this way we get an interlocking arrangement of $F'V'A'A$ and $V'F'A'A$. In all cases C is also intercalated in the course of the psycho-linguistic waves.

In the case of writing, the two systems, $F'G'G$ and $V'G'G$ enter into action, because even in visual subjects it is very seldom that the second can perform its function without the assistance of the first; in fact, the mechanism here may even be more complex. There are

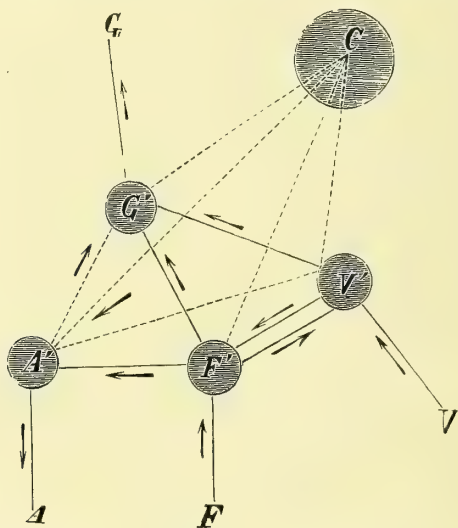


FIG. 105.—SCHEME OF THE MECHANISM OF LANGUAGE IN MEN WHO READ AND WRITE.

C , Field of concrete images and of concepts; F' , centre of phonetic or acoustic images of words; V' , centre of visual images; A' , centre of articulatory kinæsthetic images; G' , centre of graphic kinæsthetic images; FF' and VV' , centripetal paths for the waves that form the respective sensory images; $A'A$ and $G'G$, centrifugal subcortical paths for the waves expressive of spoken and written language; CV' , CF' , CA' , CG' , associative paths between the intellectual field and the receptive verbal centres. These paths must be considered as duplicated from the intellectual field to the verbal images, and *vice versa*. Other lines represent the associative paths between the various sensory and motor centres of words.

cases in which, with a lesion of F' , the regular function of G' has become impossible, and from that we must conclude that even lesions limited to F' may cause abolition of, or grave defect in, the operation of writing. The reason for this can readily be understood, as G' simply works upon the products of F' and V' .

Through this the other mode of expression of thought comes also to be defective.

For psychological and clinical reasons, it is necessary to distinguish the verbal-representative from the verbal-expressive zone. Lesions of the representative zone are those that do most injury to

the intelligence. The old and vexed question, dealt with by Locke, Spencer, Romanes, and Max Müller, whether language is absolutely necessary to the formation and the explication of intelligence, is solved by a considerable number of carefully observed clinical cases that form a strong and very practical contribution to the solution of this problem, which is one of the most important in cerebral physiology and psychology.

In a work on word-deafness (*Rivista sperimentale di Freniatria*, 1883) I stated clearly the question as to the condition of the intelligence in this form of aphasia. 'When it is said,' I then wrote, 'that he who is affected by word-deafness seems to be demented, but is not really so, I believe this to be an erroneous statement; and the error may have arisen either from the variety of cases or from defect of observation.'

The sufferer from true word-deafness has the air of a demented person, and is, in fact, a demented person of a particular variety, distinct from all the other well-known forms of dementia. It might even be affirmed that he is such, both in substance and in form. Every source of images that determine thought is at fault, and the result must be confusion, for all course of thought is arrested. It may well be doubted whether there is a definite thought present in the consciousness.

Thought, in so far as it is a product of synthesis and works logically according to the laws of association, does not exist except in the sensible form of language. If language be suppressed, perception and immediate judgments on images are still possible; not so a train of thoughts, or an extended synthesis.

With the representations only of concrete images of things we can realize merely simple and detached syntheses. As a matter of fact, aphasic subjects examined by me did not manifest thought in any other way, neither by mimicry nor by gestures, and there was no sign of those changes of physiognomy that express the working of thought and the alternations of states of consciousness. The sufferer from word-deafness is often normal in his conduct, and in the sphere of the affective or ethical sentiments, apart from his great emotivity and those cases in which there is a form of acute confusional psychosis, of which latter we shall proceed to speak.

The general aspect and features of the sensory aphasic subject are of a very plastic character. A meaningless smile may flit across his countenance, but as a rule he has a wan and questioning look, and is incapable either of conception or of expression. That it is right to consider such a subject demented is proved by the fact that not only is every source of verbal images, acoustic and visual, destroyed, but, further, every normal relation between words that are heard and the objects that these words indicate or the associations that they involve is interrupted.

The ideas are then in the intuitive state, just as when in the normal state concrete images of things are presented to the mind, which, while they set agoing the mechanism for active thoughts, do not give these a completed form in which to clothe themselves. From an examination of several patients it appears to me that we may advance the hypothesis that in word-deafness the intelligence is only potentially conserved, since it is not disaggregated as regards the substantial formation of the elementary components, as in primary or consecutive dementia.

In ordinary dementia the degenerative process, which involves the textural structure of the whole brain, tends to destroy the elementary components of thought. In aphasic dementia, on the other hand, these last exist integrally, but the processes of synthesis are impeded in so far as these result from the psychological fusion of the elementary components in the word.

The abstract products of thought, therefore, are found to be wanting, and all the states of mind that are connected with them. The process of abstraction is impeded, and the sentimental tone of the mind is substantially altered. Abstractions are at most potential, but are buried in the Dead Sea of 'the unconscious,' from which they may be raised and reconstructed in the field of consciousness, provided always this sphere is reached by the respective sensible form, with all its associative relations. Confirmation has been given to this concept by several cases, almost experimental in value, of aphasic dementia from word-deafness or blindness, with or without paraphasia, following upon temporal lesions, or lesions of the angular gyrus (optic aphasia), lesions which were equivalent to the most rigorous experimental investigation.

OBSERVATION XXXVII.—The case is that of a woman who was admitted into the clinique in a state of great confusion and psycho-motor agitation. After observing her carefully, I managed to ascertain that the confusion and agitation were due to her being affected by word-deafness. She understood only a few of the words that were addressed to her. There was also complete word-blindness (word-blindness with agraphia). This woman had been a teacher, and not only did she know Italian well, but also French, and in addition she had taught music. Subsequent examination brought out clearly the fact that she had completely forgotten music (amusia), so that not only did she fail to recognise written words (alexia), but she did not even know the musical notes. The word-deafness improved, but word-blindness remained complete, with homonymous bilateral hemianopsia on the right, complete agraphia, and extreme poverty of language, sometimes with paraphasia.

The diagnosis was word-blindness, with incomplete word-deafness, due to a destructive focus in the angular gyrus and the surrounding zone, extending to the thalamo-occipital optic radiations.

Three months before she died she was attacked by vertigo (the malady had commenced with attacks of vertigo, which had come upon this woman when her general and mental conditions were quite satisfactory).

After this second attack of vertigo she had complete word-deafness. She did not now understand a single word, whilst before the attack she had understood several. She fell into a state of absolute indifference and apathy. She no longer expressed a single thought or manifested a desire or want. She did not pronounce a single word, even though urged to do so. In short, her state was one of complete dementia, and she shortly afterwards died.

At the autopsy I found on the external aspect of the left hemisphere two foci, one limited to the middle and posterior part of the first temporal convolution, and to a small section of the second, whilst the other was in the angular gyrus, extending a little over the marginal convolution. On the right hemisphere another focus was observed, perfectly symmetrical with the one found in the left temporal convolutions. The lesion on the right was rather deep, as was also the focus on the left, reaching almost to the lateral ventricle.

From the macroscopic examination it could be inferred that the focus in the right hemisphere was the older of the two, since it was cystic, with cicatricial cords traversing the cavity, whilst those in the left temporal convolution and inferior parietal lobe were much more recent. Evidently these lesions were the explanation of the clinical complexus that we found. The lesions in the two first temporal convolutions, right and left, accounted for the grave word-deafness into which this woman had fallen toward the close. It is, of course, known that when the lesions are bilateral and symmetrical, the aphasia is grave and complete. The lesion of the parietal lobe is certainly the explanation of the homonymous bilateral hemianopsia of the opposite side, and of the word-blindness, which further might also be considered as a consensual symptom of the cortical word-deafness. The same focus affords the explanation of the grave dementia from which this woman suffered. To tell the truth, as this was the case of an educated woman, who had been a teacher for many years, and as in the course of time it appeared that the word-deafness had improved with exercise, I had attributed the whole symptomatic complexus to a lesion of the angular gyrus, being led to that opinion by the persistency, without any sign of improvement, of all the symptoms of word-blindness and hemianopsia, whilst the word-deafness had been gradually improving. It was, therefore, permissible to suppose that the dementia arose from a lesion of the angular gyrus in a subject who, as she had read a great deal, had been obliged to use a considerably greater number of visual than of auditory images in her processes of thought. Word-deafness in this case might well have arisen from the lesion of the inferior parietal lobule through interdiction of the auditory centre, and not from a coexisting lesion of the first temporal convolution. This was rendered probable by the existence of genuine forms of word-blindness, with grave dementia and other symptoms. We may well admit that, in those subjects who have had much exercise in reading, and who learn principally by reading, complete word-blindness is accompanied by formative and expressional disturbances of speech, and by profound mental disturbance (aphasic dementia). It is clear, however, that in this case a portion of the syndrome must be ascribed to the right temporal lesion. This woman must have been visual in part only, and yet the grave dementia cannot be put down exclusively to the lesion of the parietal lobe, for a part must be attributed to the temporal lesion on the right. It must be considered that the right hemisphere takes part in the psycho-somatic process of speech, for there are a considerable number of observations on aphasia (partial or incomplete aphasia) from a focal lesion in the zone of language in the left hemisphere, which became extremely grave and complete later on, when a focus had also formed in

the right hemisphere. The present case is a proof of that. The patient had already had a cerebral attack, with the formation of a destructive focus on the right hemisphere, which certainly had occurred a long time before she was admitted into the asylum. On her second seizure, the mental disturbance was such that she had to be taken to the asylum. At this point it is doubtful whether the second focus was that of the temporal lobe or of the parietal lobule on the left side, because, when admitted, the patient showed word-deafness and word-blindness, and it was only when she had had her last attack, towards the close of her stay in the asylum, that she became completely aphasic and demented. We might summarize her clinical and pathological history thus: the first focus was formed in the right hemisphere, in the temporal lobe; the second in the angular gyrus on the left, which brought about the word-deafness, either through its proximity to the auditory centre of speech, or through the persistent lesion of the right temporal zone; the last lesion occurred in the left temporal lobe, and then all mental activity whatsoever was suppressed.

OBSERVATION XXXVIII.—The following is a case which is still more conclusive than the foregoing, owing to the limited area occupied by the lesion: The patient was received into the clinique in a state of almost complete dementia and a prey to extreme agitation. He talked ceaselessly, became excited, struck himself on the head with his fists, and inveighed against others; but he could not manage to formulate a single phrase.

He had fallen into this state almost instantaneously, without any premonitory symptoms. His agitation abated considerably, and when it became possible to examine him, we found the classic picture of word-deafness. The subject did not understand a single word, not even the simplest, that was addressed to him, and he spoke only unintelligible fragments of words. He presented no visual disturbance. He saw everything, understood, and could make visual movements, but with words it was impossible to make him understand anything at all. He expressed not the slightest thought or sentiment. His mind was in a static condition, but was at the same time vacant (dementia). He remained in this state for two weeks, and then died of pneumonia.

At the autopsy the only lesion found was a focus of softening in the first left temporal convolution, and this softening extended in a rather less degree as far as the angular gyrus. All the rest of the hemisphere was sound, as was also the right hemisphere.

OBSERVATION XXXIX.—B. C., following upon an attack of indigestion, was suddenly seized with violent trembling of the whole body, followed by convulsive movements of the limbs, which were accompanied by loss of consciousness. This attack lasted for some hours, and was succeeded by a state of torpor, from which he awakened with complete right-sided hemiplegia. He commenced to recover slowly after about ten days, but the persons around him observed that he had almost completely lost the power of speech, and could pronounce only with difficulty a very few words, such as 'mangiare,' 'bere,' etc. (eat, drink, etc.). These troubles were gradually alleviated in part, until the patient reached the condition in which I examined him.

Since his last attack he had shown some defect of observation, and would readily mistake a balcony for a door. He had suffered also from marked disturbances of memory, and exaggerated emotivity, with facile and disproportionate motor reaction. For these reasons he was taken to the asylum. He could scarcely see with the left eye, owing to

cataract. With the right his power of vision was extremely limited, and even at a short distance objects were confused and ill defined, whilst he frequently mistook a coin of five centesimi for one of ten, or for a lira. He easily recognised all colours except blue, which he could not distinguish at all. His field of vision was restricted, and there was hemiopia on the right.

The muscular force, both in the upper and in the lower limbs, was fairly well preserved.

The dynamometric indications were: right hand, 38; left hand, 40. His walk was slow, but not uncertain; he raised his feet but little when stepping, and the soles of the feet slightly scraped the ground. This was not paralysis, but the walk of a man in a state of debility. It was impossible for him to balance himself on one foot, even with his eyes open.

This man, who had been a printer from his youth, and had gone to Naples specially to set up a printing-office there, must consequently have been enterprising, educated, and of more than average intelligence. So much might be judged from the fragments of speech, from his eye, that tried to express so much, from his open and sympathetic face, from his consciousness of his actual condition, in contrast with what it had been, as he himself said. He would burst into tears and fall into despair at being reduced to such a state of ignorance, and at his inability to express a single thought.

As a matter of fact, he understood everything that was said to him, as was proved by his words and gestures. Sometimes he was slow in answering, and at other times it was necessary to repeat words to him, but he always ended by receiving and understanding them. His own speech, however, was broken and fragmentary, and most frequently, after commencing a phrase with a pronoun, a verb, or some adverb, he stopped, and could go no further. He was unable to help himself, even by the use of periphrasis. The object escaped him, in consequence of which he was so much grieved that he would commence to weep, repeating over and over again, 'But I used to know that quite well; why don't I know it now?' 'I have repeated that so many times.' 'What is to become of me?'

If the word that he was seeking were suggested to him, he would repeat it at once with pleasure and satisfaction, whilst his eye would gleam for a moment. Thus he remained: his language became impoverished, even in the use of words, and especially in names of persons, places, and things, so that at last he could not even remember his own name. His articulation of spontaneous or suggested words was perfect, with the exception of a few paraphasic errors, which, however, he corrected if his attention were drawn to them, and sometimes even spontaneously.

If a piece of printed or written matter were put before him, he could not read it, being unable to make out either word or syllable. Further, if the syllable that he did not manage to read were suggested to him, he would repeat it as some phonetic symbol that he had heard, but he did not read it, and he could not persuade himself that the letters, in their union as graphic symbols, formed the syllable. For him the letters had lost their significance as component parts of syllables and of words. Sometimes he managed to read a syllable or two, but it was impossible for him to associate several syllables, and this even of the few that he managed to read with difficulty. Further than that, perhaps he would recognise some letter in a word, or several letters, and out of these he would form a word for himself, but not at all corresponding with the word under his eye. He thus furnished a classic example of paralexia.

Here are some specimens :

Fazzoletto	..	..	..	lucio
Bottone	..	..	..	giappon
Catena	..	..	..	giocan
Sfera	..	..	..	alfabeto
Chiave	..	..	..	atrio
Coltura	..	..	..	suola
Bocchetta	..	..	..	traversa
Campana	..	..	..	stampa
Vetro	..	..	..	ferro
Sughero	..	..	..	strada
Giornale	..	..	..	inotalio

His spontaneous writing was unintelligible. It was only with difficulty that he could write even his own name, for he distorted that and every other word (dysgraphia with paragraphia). He wrote well to dictation.

He died on the morning of December 4, after another cerebral attack, and an autopsy was made twenty-two hours after his decease. The following lesions were found :

On the right hemisphere—

1. A small focus of softening in the external segment of the lenticular nucleus.

2. A small focus of softening in the white substance of the first frontal convolution, in front of the foot of that convolution.

3. An old focus of softening in the convolution of the corpus callosum, corresponding in position to the splenium, and extending upwards over the lower third of the lobus quadratus or precuneus, and going deep into the gray substance.

On the left hemisphere : An old focus of softening, corresponding in site to the angular gyrus. This was particularly destructive to the gray substance of the posterior part of the first temporal sulcus, just where it terminates in the angular gyrus. This focus spared the first and second temporo-sphenoidal convolutions completely, and went deeply into the white substance of the angular gyrus, as far as the posterior cornu of the lateral ventricle.

There was nothing noteworthy in the remainder of the left hemisphere, in the mesencephalon, or in the cerebellum.

The syndrome constituted by the alexia, paraphasia, dysgraphia, and the grave amnesia that characterized the dementia of this man, was to be attributed to the lesion of the angular gyrus on the left. Since he had done the work of a printer for forty years, we may suppose that the visual centre for words had become the great workshop for the fusion of thought with word. The destruction of this workshop was the cause of his very severe and irreparable mental disaster.

In such cases we have almost invariably to deal with cultured individuals—speakers, teachers, judges of the higher courts—almost always with men who make great use of words, who become demented instantaneously. In addition to the cases published, I mention two that have come under my notice quite recently.

OBSERVATION XL.—A professor of literature was one day seized with vertigo after giving his lesson. At the same time he felt a tingling and some numbness in his right limbs. He was taken home, but to the members of his family he could hardly express what he felt or what he wished in an intelligent fashion. His greatest difficulty was to find words, which failed him almost completely, with the exception of the most common and vulgar expressions, these being sometimes pronounced out

of place. At the same time, he became extremely confused, and rather agitated. In the course of a week his agitation gradually disappeared, as also the hemiparesis, but he had forgotten his whole vocabulary. He was a man most learned in literature, and knew by heart almost all the cantos of Dante. After the attack of vertigo he did not recollect even a single verse, and this drove him to desperation. He could not even name any of the commonest objects. He was hemiopic on the right. He passed his days in a state of indifference, as one stunned, and as though his consciousness were a mere void. In two months he had not shown very much improvement.

OBSERVATION XLI.—One of our most distinguished judges, in the full vigour of health, passed his holidays in Naples, and was starting home again. He left his house one autumn evening, and secured a passage on the steamer, but before it left he had a fit of vertigo. He did not fall down, but lost his bearings. He could not pull himself together again, either in thought or in words. Not only was he unable to formulate a phrase, but even the few words that he did pronounce were distorted. He went ashore again before the steamer left, and after he had reached home I was called in to see him. On examining him, I found no disturbance of motion, for he walked perfectly well, and could use both hands just as before his attack. On the day following his attack of vertigo he was conscious of a certain degree of numbness, which, however, disappeared. I found only that the patellar reflex on the right was slightly exaggerated. There was bilateral homonymous hemianopsia on the right, and almost complete alexia for words and for letters, so that he could not spontaneously write a single word in its correct form (dysgraphia). It was impossible for him to copy. He could write a few phrases to dictation, but with difficulty. There was no word-deafness, but it was necessary to speak plainly, and sometimes to repeat phrases, in order that he might understand them. His own speech was reduced to broken and distorted phrases, made up of words that were almost all mangled. He was confused, and could not express a single thought, even by mimicry or by signs. He would often smile, and when not speaking he appeared to be sane, composed, correct, and gentlemanly; but he had forgotten almost every word, and all his vast knowledge and learning were effaced. This patient, who had been a most studious man, had become vacant. Certainly he was a visual subject, and the variety of aphasia with which he was affected could be defined as optical aphasia with paraphasia, paraphrasia, and dementia (aphasic).

Other similar cases have been published by me (*Annali di Neurologia*, 1892; *Policlinico*, 1894; *Trattato delle malattie del cervello*, in the *Patologia Speciale* of Maragliano e Cantani, 1901).

In the face of clinical observations of this sort, and of discoveries on functional localization in the cerebral cortex, the period of introspective discussion closes, and the dawn of a new and more fruitful era is foreshadowed by the accumulation of facts that are of immense value for psychology.

When Locke expressed himself on the relations between intelligence and language in the clearest and most precise terms, saying, 'We have reason to imagine that they (brutes) have not the faculty of abstracting or making general ideas, since they have no use of words or any other general signs,' he saw a great truth, but it lacked objective proof. The same may be said of the thoughts

that fell, like ripe fruits, in the domain of Science, from the discussions about nominalism, carried on by Berkeley, Mill, Romanes, and others. These results, which were the work of speculation, could not enjoy the fortune of final acceptance (this applies to all products of introspection) unless validity were given to them by objective observation. Although Romanes held that the process of thought was a development, that the faculty of abstraction, which is always of the same species and is an evolution, was wholly dependent on the faculty of language ; though Taine declared, with great lucidity, that we conceive characters, abstracted from things, by means of abstract names, which are our abstract ideas, and that the formation of abstract ideas is nothing more than the formation of names, we may well affirm that these great conceptions lacked the certificate of authenticity that can be given them by clinical observation and by anatomico-pathological findings, which have proved that, if the cerebral area in which are registered the sensory images (auditory and visual) of words be destroyed or interdicted, then the source of all abstract ideas is suppressed ; for these abstract ideas, even if they exist potentially, do not venture to cross the threshold of consciousness, or, if we desire to express ourselves with greater precision, they cannot be reproduced, because movement of abstract thought is not realizable except through sensible forms, and these are words.

Quite recently H. Gomperz (*Zur Psychologie der logischen Grundthatsachen*, Leipzig, 1897) has treated this question with great acumen, and he has come to conclusions identical with those that I had published ten years before on the basis of clinical observations. He maintains that the being who is not endowed with language will not be able to form general ideas or abstract ideas, propositions, or reasonings. Such a being will be conscious only of sensible images.

It might be objected that the state of some sufferers from word-deafness is very grave when there is a defect of the sensible forms of thought (almost all the nouns, and many adjectives and verbs), although they preserve intact and reproducible the empirical and concrete images of objects, places, events, etc., whilst many imbeciles, who have a very poor vocabulary, and nothing at all in the way of abstract ideas, and whose stock of concrete and empirical images is much less than that which is possessed by a man affected with word-deafness, nevertheless appear to be more intelligent. That might lead us to consider that the dementia of these subjects is to be attributed not to the word-deafness or word-blindness, but to some other circumstance. No one will deny that other circumstances can impart the most diverse characters to the clinical picture. The extent of the focus, its depth, and consequent interruption of numerous associative paths ; the greater or less participation, material or functional, of the areas surrounding the language

part that has been injured ; the greater or less loss of mnemonic capital accumulated by other senses, and the effect of the cerebral lesion itself and the shock that results from it, are so many causes of different behaviour on the part of sensory aphasic subjects. Add to this the difference between a being who has not reached the height of abstract thought, represented by language, and another who has moved in the sphere of abstraction, of which he has lost the dominion, as the result of destruction of the phonetic area of the cerebral mantle.

Whilst the imbecile, and even the idiot, utilize their modest mental patrimony, co-ordinating it with the immediate needs of their lives, individuals who are intellectually well endowed, and who live their mental lives in the most elevated and most extensive spheres of nominalism and conceptualism, are put out of their bearings when this field is closed to the mechanism of the formation and expression of thought. No longer can any of the products of the mind be utilized, and these subjects appear to be amnesic. It is as if all the separate parts of a complicated mechanism were prepared in their respective workshops, while there is wanting a workshop with the special operators to put the parts together, so as to form a complete piece, ready to work.

These sufferers have only a confused consciousness of their trouble, and often they appear to be perfectly satisfied with themselves, or they present all the phenomena of mental confusion, with the addition that they frequently distort the words they employ to express images and states of emotion.

When general ideas have been violently suppressed, the affective and emotional colouring of these ideas also disappears in great part. In this state they cannot grasp the meaning of the speaker, even though they understand a few words, nor can they themselves formulate a clear thought. Often they are grieved thereat, but in most cases they remain simply like the plastic figures in a marionette show, motionless, impassible, vacant, or wondering—true points of interrogation in the mute and solemn language of a clinique of nervous sufferers.

Sometimes dementia of this order is accompanied by extreme psycho-motor agitation. In recent years I have observed two cases of educated persons who, overtaken by brain troubles, thrombotic or hæmorrhagic, resulting in word-deafness, showed great confusion and psycho-motor agitation. In one of these cases there were clear signs of delirium of persecution, with threats, impulses, and great agitation. These were mingled with paraphasic and dysphasic phenomena. On careful examination there was found nothing more than grave and complete word-deafness, and from this arose the psycho-motor excitement. If the lesion is not very extensive, and if the patient be re-educated, his re-education tending to renew the auditory verbal relations with the external world,

then the agitation disappears, and the intelligence is reawakened. These are the cases of compensation, when the foci are small, or when there exist individual dispositions allowing of compensation by the right hemisphere, the influence of which, I here repeat, cannot be denied in the function of language.

When the above is not possible, the agitation, and particularly the confusion, which is often serious, last for a long time.

Every word that a sufferer from sensory aphasia learns, means a more or less general idea, and in the consciousness of the individual it fills up a void, represented by a negative sensation of the loss of something that the person had formerly possessed. The personality is reintegrated little by little, by every word with which the vocabulary is enriched, like an edifice that has been overthrown by an earthquake and is built up again with the same materials, stone upon stone, on the same foundations, and with the same architectural plan.

One of our patients, whose vocabulary had been effaced all at once, and who was reduced to such a state that he was incapable of writing even his own name, although there was no trace of paralysis, gradually recovered the ability to write, in proportion as his mnemonic capital of words was revived. In order to write the words, it was not sufficient that he should be able simply to articulate them ; it was necessary that he should understand them, associating with them the images of the objects, of their qualities and their relations, thus rising again into intellectual life. The same thing happens with the ability to read, which is recovered only after the pages of one's vocabulary have been refilled. In that process of re-education I could confirm what I had already observed—namely, that the acoustic image reawakens the visual image of syllables and words, as well as the graphic image, by way of the ideative field ; that is to say, that the phonetic image *per se* does not reawaken the graphic and the visual image until after it has itself been associated with the correlative idea, forming a coalescent whole of real intellectual value. It is then that the behaviour of the patients is observed to change. One of these sufferers, when he had regained consciousness of himself, by virtue of the reacquired power of speech, permitting the movement of thought that was formerly inhibited, came to recognise his real relations with the external world, and, as though awakening from a sleep that had overwhelmed him for a long time, he remembered his family, his social position, his profession, his duties, his ability to earn all that was required for their needs, also the impropriety of continuing to live at the cost of the asylum. He conceived a strong and rational desire for liberty, whilst he was grateful for all that had been done for him. His look became more mobile and intelligent and his physiognomy more expressive and composed as events unrolled before him. He had a perfect know-

ledge of persons, places, and circumstances, and he could explain everything in the small sphere of his life. There was much still to be regained by him when I dismissed him from the asylum, but he had already gained much, and his personality, if not wholly reintegrated, was certainly recomposed in its general lines. In such cases we must not neglect to take into consideration that degree of intellectual decadence to which almost all individuals affected by a malady due to destructive focus of the brain may be subject.

In cases of pure aphasia, then, we may be guided by the same scheme that has served to enable us to understand the various forms of aphasia.

1. Simple agraphia due to lesion of G' , or of the afferent paths, does not involve any appreciable disturbance of the intelligence

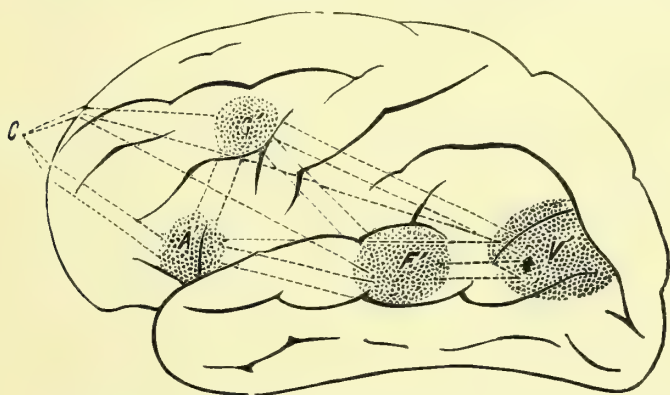


FIG. 106.—TOPOGRAPHY OF THE ZONE OF THE NEUROPSYCHIC FACTORS OF LANGUAGE.

F' , acoustic zone; V' , visual zone; A' , motor zone, for the spoken word; G' , presumed motor zone for writing; C , intellectual field, which in this scheme is represented only by the frontal lobe, but comprises all the sensory zones, whose reciprocal relations with the field of speech have been omitted, in order to make the figure clearer.

and of the personality, because the intellectual patrimony can be reproduced in its sensible form, as in the case of a sane person.

2. The same thing may be said of motor aphasia, properly so-called, produced by the lesion of A' (foot of third left frontal convolution) or of the efferent paths. Here, however, it should be noted that motor aphasia often induces agraphia (Lichtheim) and alexia (Dejerine)—that is to say, that at least in some cases another more important section of the mechanism of language and of thought is inhibited. The loss is apparent, and is really more serious when the lesion extends also into the white substance (subcortical), in which case there disappears, along with the power to write, every other means available to thought for translating itself into symbols perceptible by others.

It is clear that, when the thoughts of an aphasic subject can be

expressed in writing, it is much easier to examine and form a judgment of his psychic personality ; nevertheless, even when the aphasic subject cannot write, his personality must not be held to be notably diminished or profoundly disaggregated if he can understand those who speak to him and can express himself by signs.

Amimia and paramimia are less definite as regards their seat and their signification. I am convinced that many of the cases described by the old authors as examples of amimia and paramimia were varieties of word-deafness, but those associated with motor aphasia, whether word deafness is a concomitant or not, are always the expression of strong intellectual decadence.

3. Optic aphasia presents various forms and varieties. There may be simple abolition of the capacity to recognise written words, though the intelligence is well preserved (simple alexia). Those thus affected are able to write, yet they cannot read even what they themselves have written. In such cases there is no disturbance either of the formation or of the proper manifestation of thought.

In another form of optic aphasia the power of recognising objects as well as written words is lost, and the patients can no longer distinguish one object from another. In this case the centre where images of objects are registered is destroyed, or does not perform its function, and hence the images cannot be re-evoked ; consequently, the image to be confronted with them in the perceptive process is lacking, and this image is necessary if there is to be recognition. As is perfectly clear, these subjects have lost a part of their mnemonic capital, which is always of great intellectual value. Sometimes they are confused, owing to their incapacity to re-evolve visual images of objects, persons, or occasionally even of places. This form of optic aphasia always induces a grave disturbance of the psychic personality, even when, as frequently happens, it is not associated with functional disturbance of the auditory centre of words, for the simple reason that the patrimony of visual images is very great in every individual, and it is through the visual components that an infinity of more complex thoughts is formed ; and if there are bilateral lesions of the occipital lobes, those thoughts are decomposed and are no longer representable, not even by means of their respective words.

Finally, we have, as already mentioned, the optic aphasia of so-called visual subjects, the effects of which on the intelligence are analogous to those of acoustic aphasia or word-deafness. In these cases we must speak of true *aphasic dementia*.

4. The form of aphasia in which we meet with the most profound disturbances of the intelligence is acoustic aphasia, or word-deafness. Here, too, however, we must make a distinction. We may have subcortical word-deafness, due to a lesion of the afferent paths, while the integrity of the acoustic centre of language is pre-

served. In this case the individual is able to read, and can express his thoughts in spoken words, and frequently in writing as well. Since the centre of language has been spared and the register of acoustic images of words is unharmed, and since there is no interruption of the associative paths leading to and from the kinæsthetic centre of speech and the intellectual field, the other centres also remain active; the mechanism for the formation and expression of thought is therefore left in an undisturbed condition. Consequently, there is either no disturbance of the intelligence or the disturbance is such as would not warrant us in admitting any notable diminution or disaggregation of the psychic personality. The lesion in these cases is found on the afferent paths leading to F' (Fig. 106). If, however, F' is destroyed, and especially in the case of an auditory individual, the psychic personality is reduced and altered, for the reasons already mentioned. It is in these cases that we find the maximum degree of confusion and of mental disaggregation.

5. Let us now examine the other case, the so-called aphasia of conductivity or of association (the *Leitungsaphasie* of Wernicke).

In this case the lesion interrupts the associative paths F' A' and hence the acoustic word-images that must pass over them in order to excite A' do not reach this last centre, whose disordered activity translates itself into a veritable syllabic anarchy.

Two cases may arise: either the lesion is very much circumscribed, so that it does not affect the functions of F', and as the evocation of acoustic images is therefore normal, whilst the associative paths between F' and C are not interrupted, the intelligence is preserved; but it has difficulty in manifesting itself in spoken, and sometimes even with written, words, according to the extent and depth of the lesion. In this case the individual hears and understands the person who speaks, recognises persons and objects, has representations of words (internal diction), and his thought is logically developed; if he cannot read aloud, it is still possible for him to read inwardly. In any case, from the very correct and well-ordered conduct of the individual, from his attitude in response to the various emotions aroused by the words of others, from the regular co-ordination of his actions, from his gestures and his mimicry, we can judge that his intelligence has been preserved to a very great extent, and that the anomaly of thought does not lie in its formation or its associations, but lies in the mechanism for the expression of it. The disaggregation is only apparent; in reality all the constituents of thought exist, and, in regular association one with another, they furnish material for the consciousness to work upon. Should the centre of verbal images F' subsequently become paretic or interdicted, owing to the extension of the focus, the case resembles that of acoustic aphasia, with this difference, that the dementia is sometimes temporary (Bianchi, *Il Policlinico*, 1894).

CHAPTER XXXV

TRAUMATIC DEMENTIA

TRAUMATA on the head produce widely differing results, sometimes really disastrous. Here also occur a number of circumstances, intrinsic and extrinsic, the value of which cannot always be estimated. Among the intrinsic circumstances falls to be noted the different capacity to bear wounds that different subjects show under the same conditions. Whilst relatively slight traumata produce grave consequences in certain individuals, in other cases traumata that are violent and apparently grave have very slight effects. Among the extrinsic causes are to be noted the angle of incidence of the trauma and the greater or less elasticity of the cranium, as well as the nature of the trauma itself.

As a matter of fact, in traumatism it is well to distinguish direct action from indirect action, through repercussion on the opposite parts of the cranium, where there may be formed congestion *ex vacuo*, sometimes with hæmorrhage. It is well known that congestion and hæmorrhage, as well as laceration of the nervous substance, are produced in different parts of the brain, either in the direction of the blow (Duret) or at points where the tissues have a different specific gravity (Tillmann).

If the question of traumata be considered from this side, it appears clear that a sharp instrument which strikes the cranium must produce different effects from those of a blunt instrument causing contusion.

We must also take into account the state of mind, which forms a factor of great importance in the constitution of the morbid picture of traumatic insanity.

Here we cannot consider direct injuries to the brain, because these come under the head of post-apoplectic dementia.

In general the morbid picture varies greatly, according to the seat and the gravity of the wound. In this case also, as in that of destructive foci, we must note two successive syndromes—the one immediately following the wound, and the other more remote, wherein we have the disappearance of many symptoms of the immediate syndrome and the appearance of some others, which we may

term secondary. Here I have nothing to add to what I have already said about the symptoms, which vary according to the seat of the destructive foci.

As to those traumata on the head that do not cause direct injury to the brain, we must make a distinction between such as induce hæmorrhage or lacerations in the region subjected to the blow or in distant parts and those in which nothing of the sort happens, but simply a slow regressive change in the nervous elements, and the appearance at the same time of a series of symptoms closely connected therewith. In this connection I must observe that the region of the cranium that is struck is not without its influence. In the cases of some patients admitted to the clinique, and also among patients in the outdoor department, I have noticed that a blow on the occiput has consequences very different from those of a blow on the frontal region. In the case of one of these patients a blow with an axe on the upper part of the occipital region, which could not have penetrated, because there was no evidence of any lesion of the occipital lobe, had, however, brought about a clearly cerebellar syndrome, from which the sufferer gradually recovered during his stay in the clinique until he was quite well; another patient, who had been struck on the front of the head, for a long time showed phenomena of grave mental decadence, especially inability to evoke, superficiality of judgment, with slowness of perception, incapacity to pay attention and to work steadily, great affective excitability, and moody humour.

We are therefore justified in coming to the conclusion that in a certain number of cases the symptomatology of the traumatic psychoses is characterized by phenomena of deficit in the function of the part of the brain underlying the seat of injury.

It is clear that we cannot consider as traumatic insanity all those psychopathies the history of which includes the action of a trauma on the head, for we often meet with most diverse psychopathic forms, in the ætiology of which a traumatic action figures merely as a possible ætiological factor.

We can take account only of those wounds to the brain the symptomatology of which coincides with that of the circumscribed or focal cerebral lesions (and it is unnecessary to reproduce in this chapter the clinical pictures of these), or of those psychoses that arise as a consequence, mediate or immediate, of a trauma, under some form or other, and in a very insidious manner. It is our intention to speak only of traumata that act upon the head, for it would neither be proper nor would it contribute to clearness in dealing with this subject if we considered all those psychoses that arise subsequently to a trauma on some other part of the body (fracture, dislocation), or as the result of surgical operations. In these latter cases many other causes co-operate in producing the effect—*e.g.*, fear, moral shock, chloroform, etc.

For the other cases, at the utmost it may be admitted that severe traumata on the head induce, as a consequence, a lessened power of resistance of the brain to ordinary morbigenous agents. Thus only can we explain why, after a severe trauma on the head, an abscess develops after a long interval ; or why a form of acute hæmorrhagic encephalitis appears in individuals who had not previously shown any tendency to nervous or mental maladies, and who presented quite insignificant symptoms immediately after the action of the trauma. I advance the hypothesis that, as a result of traumata on the head—if at all severe—the brain loses its phagocytic or biometabolic power over the toxic substances or the micro-organisms that are in circulation, and which more readily affect an organ that has not the power to destroy them, particularly if there is a hereditary or acquired predisposition to the disease.

As a rule, therefore, traumata are rarely the cause of immediate mental disorders, if we exclude those phenomena arising from cerebral commotion and from lesions of the various regions of the brain. An exception to this rule would be formed by the case of Phelps, who expresses an opinion that is not original, but is still of great interest ('Traumatic Injuries of the Brain and its Membranes'). According to this author, traumatic lesions of the frontal lobes—frequently of the left, not often of the right frontal lobe—are a cause of grave, specific, and immediate mental disturbances. These are said to have been present in every case (aberration or deficiency), and were quite independent of the stupor. In the subcortical variety of traumatic lesions slowness and apathy predominate, while in the cortical variety there is a predominance of errors of memory, defect of attention and of control, incoherence, deliria, and stupor, depending more on the delirium and the hallucinations than on poverty of ideas. The distinction between subcortical and cortical syndromes is not solidly based upon observation.

The symptomatology is of the most varied character. We distinguish between those psychoses that develop immediately after the cerebral commotion (coma of greater or less duration) and those that have a more distant relation with the trauma, in so far as they are developed at a late stage.

When the psychosis develops after the coma, it may be separated from it by a short period of partial awakening of the consciousness. In most cases we have here a delirium, more or less intense, chaotic, with states of dreaming, dysorientation of varying degree, notable dissociation of ideas, extreme motor agitation, and sometimes a tendency to acute excitement. This state may last for a few weeks or even for two or three months. The reintegration period then commences, with slowness of ideas, more or less marked mnemonic lacunæ, incapacity for mental work, specially in arithmetical problems, and amnesia of the whole acute period of the malady.

The reintegration may attain normal limits, but as a rule there is some deficit.

In another group of cases, and particularly in those of individuals who have hereditary predisposition, or who have made excessive use of alcohol, there may be a real acute hallucinatory delirium, with great agitation, mental confusion, and dysorientation.

These hallucinatory forms (traumatic hallucinosis) may be protracted for a long period, or they may give place to states of stupor with katatonic syndromes, nowise different from those already described (cases of Von Muralt, '*Katatonische Krankheitsbilder nach Kopfverletzungen*,' *Allg. Zeitschr. f. Psych.*, lvii.).

Another variety of traumatic psychosis is constituted by those cases in which, after more or less profound coma, a condition of stupor continues, greatly varying in degree and duration, along with slowness of thought, weakness and infidelity of memory, and confusion, without delirium and without hallucinations; sometimes we can find, as it were, only a duplication of the consciousness. A lady who was under my care presented a completely altered character, and though she was conscious of the external world and was in regular relations with it, she showed herself irritable or merry to an unusual degree, and frequently repeated the selfsame things. As a rule, these patients are extremely excitable and irascible. Some of them present the phenomenon of retrograde amnesia, as in the cases mentioned by me in the chapter on memory (Part II.).

There are also found cases of post-traumatic, agitated melancholia, such as Huguenin's case.

In another group of cases we find attacks of epileptic or of hysterical character. In both of these cases somatic phenomena are frequently present, but while the attacks of epilepsy bear the character of their organic origin, the others merely assume the imprint of hysterical neurosis. We shall speak hereafter of the epileptic variety. At present it is of importance that we should fix our attention on the hysterical forms. Here I cannot enter upon the debated question of the genesis and nature of the traumatic neurosis; still, I must not neglect to call attention to the hystero-neurasthenic character of those subjects in whom we find the prevalence of hypochondriacal manifestations, concentration of thought on the malady by which they have been seized and upon its cause, a tendency to exaggerate their own sufferings, or the more evident symptoms of the malady—an egoistic and egocentric condition of mind, with an exaggerated susceptibility to suggestion.

This condition of matters is much more frequent and persistent among us since the passing of the Accident Law, which excites the hope of deriving unexpected advantages from those accidents that have been the cause of the trouble. Lawyers and doctors join in perpetuating a state of matters that would otherwise cease within a very short time. Amongst others, I briefly mention here the

case of a young man, a travelling postman, who was left for some hours in a stuporous state after receiving a shock in a railway collision. It was impossible to find out whether he had had hysterical convulsions, but on the following day he was found to be paretic on the left side. After a few days the paralysis was complete, and later on contractures showed themselves, as in hemiplegia due to a destructive focus. The whole morbid picture was contradictory of classic hemiplegia due to a cerebral focus. I had occasion to see him some months after the accident, when the difficulties of diagnosis were easily overcome, and hysterical hemiplegia was recognised. The sufferer presented all the psychic notes of hysteria (see the chapter dealing with that subject). In the meanwhile, the hemiplegia had persisted without variation for over three months, and by this time legal action had been taken against the railway company by him and by others who had received contusions in the collision. As soon as the lawsuit was decided and he had received rather a considerable sum of money, all the symptoms of the malady disappeared as if by enchantment.

Traumatic psychoses of late origin also assume varied forms. The commonest of all, as will be found from an extensive list of cases, is one of the forms of neurasthenia, which persists even when the subjects are completely freed from the somatic phenomena that accompanied the action of the trauma. The sufferers from this form show a profound change in character, along with cephalalgia and various painful sensations in the head, and also vertigo, which is sometimes grave. They are in particular extremely irritable, and become susceptible, captious, intolerant, irascible, impulsive, extremely emotional (explosive diathesis of Kaplan), sometimes negligent in their duties, whilst at other times they take less interest in their families, to which they had formerly shown themselves most attentive. They become cynical, are careless and indifferent, and show a tendency to vagabondage. Along with this degeneration in the affective and volitional spheres we find other phenomena of no less importance in the intellectual sphere. They are less capable of standing the strain of intellectual labour, their thoughts are faulty and not so well nourished, their memory lacks fidelity, their power of attention is very much depressed, and their imaginative power is poorer. Frequently vaso-motor phenomena of great importance coexist with the foregoing (see Kopper, *Archiv f. Psych.*, vol. xxxiii. ; Guder, *Die Geistesstörungen nach Kopfverletzungen*, Jena, 1886).

Mania is not rare, and most frequently it assumes the character of maniacal-depressive or circular insanity. Another variety, also frequent, is represented by the epileptic psychosis. The epilepsy may form part of the primary symptomatic picture, or it may develop late—months or years after the trauma. The fits are repeated, and are soon associated either with the true epileptic

psychosis or with the epileptic character. As a rule, these conditions are aggravated by alcoholism.

Cases of late development of paranoia, of acute dementia, of katatonia, or of mental deterioration, are not wanting.

In other instances the emotivity is enormously increased, and the patients suffer from cephalalgia, vertigo, fulness in the head, sudden pallor, and also intolerance of alcohol (traumatic vaso-motor neurosis of Friedmann). Very frequently we find late post-traumatic vulnerability of the brain, whereby alcohol, auto-intoxications, influenza, and other infectious diseases find a favourable soil for the development of grave forms of psychosis. Whether subsequent progressive paralysis is to be considered as a late cerebropathy due to the trauma, or whether the trauma should be held to be merely one of the ætiological coefficients, is a matter that does not seem to us to be as yet sufficiently demonstrated (see, however, Werner, '*Ueber die Geisteskrankheiten nach Kopfverletzungen*,' *Vierteljahrsschrift f. gericht. Medicin.*, 1902; Max Edel, '*Ueber Unfallspsychosen*,' *Psych. Wochenschrift*, 1901).

Pathological Anatomy.—Fractures of the skull, direct injuries to the brain, hæmorrhages, cerebral abscesses, and consecutive meningitis cannot be discussed in this chapter. It must suffice to mention them, and to refer the reader to general treatises for a full description. The more or less extensive destruction of the cerebral tissue, and the consecutive inflammatory processes are comparable to destructive foci, so far as regards the functional deficiency that follows from them. We have already said something on this subject. Hæmorrhage and lacerations produce secondary alterations, cicatrices, and inflammatory residua, with or without thinning of the bones of the cranium. It is necessary to take account of the swelling of the injured tissue, which immediately increases the endocranial pressure. This increase of pressure is not without influence on the subsequent delicate alterations that occur in the structure of the nervous elements (Walter B. Cannon, *American Journal of Physiology*, vol. vi.).

As a matter of fact, these alterations appear very early. In an experimental study Scagliosi is reported to have found the commencement of a degenerative process in the cells of the glia seven hours after the experiment, and in the nerve-cells forty-four hours afterwards ('*Ueber die Gehirnerschütterung und die daraus im Gehirn und Rück. her. histologischen Veränderungen*,' *Virchow's Arch.*, vol. clii.). Lutzenberger found a polar distribution of the chromatic substance in the cerebral cells.

Such degenerative processes may be set up in the most varied and distant parts of the brain, as in one of the cases of Adolf Meyer (*American Journal of Insanity*, vol. lx.).

Whether the degenerative process, once it has commenced in

the nervous tissue, is progressive, and gives rise to progressive paralysis, or whether the trauma simply accelerates the degenerative process in a predisposed brain, is a problem of which no certain solution can be given. Some observations of my own might induce belief in this latter possibility, although the results are not borne out by more recent observations, such as those of Kaplan (*Allgem. Zeitsch. f. Psych.*, vol. lvi.), of Frost (*American Journal of Insanity*, 1903), of Meyer, and others.

According to some (Friedmann, Kronthal) the trauma occasions the development of arterio-sclerosis and of hyaline degeneration of the vessels. These affirmations also are still insufficiently verified.

There is a further possibility of the development of neoplasms in consequence of traumata; 118 cases of neoplasms, probably of traumatic origin, were collected by Alder (*Arch. f. Unfallheilkunde*, vol. ii.).

Diagnosis.—The diagnosis should not present serious difficulties. Since the traumatic psychosis does not possess any special and differential character, the diagnosis can be founded only on the history of the trauma. Such knowledge, in conjunction with the phenomena described, authorizes us to recognise in a symptomatic complexus the traumatic nature and origin of the malady. In every case we must bear two facts in mind: First, that the trauma on the head can only increase the cerebral vulnerability, and predispose to mental maladies, exalting the susceptibility to, and the intolerance of, auto-intoxications and hetero-intoxications, as well as the liability to infection. In this case the post-febrile psychoses (of influenza, typhus, etc.), or the psychosis due to alcoholic intoxication may preserve their own proper character: Second, that the percentage of psychoses consequent upon traumata of the head is relatively very small. After the Franco-Prussian War, of 1,785 men wounded in the head, only 13 became insane. From 981 injuries to the head, collected by Stolper, of which 138 had given rise to very serious concussion, there resulted only 12 cases of insanity.

From the medico-legal point of view, account must also be taken of the hereditary predisposition and of alcoholic habits, as well as of the antecedent character of the persons sustaining traumata.

Some time ago I had to express an opinion as to the origin of an epilepsy that had developed in a woman who, when travelling by railway, suffered an injury to the head, owing to the very sudden stoppage of the train. She showed slight contusions, with ecchymosis on the supra-orbital region, but without wounds or fracture. Inquiries into her family history clearly proved the pre-existence of a character excitable, impulsive, irascible, and aggressive to an extreme degree. In such a case, from the psychic character, the latency of epilepsy was very evident.

The shock, which cannot have been very severe, simply removed the last slight obstacle to the outbreak of the convulsions.

Prognosis.—The prognosis is rather grave, especially if there are somatic phenomena dependent on lacerations, hæmorrhage, loss of blood, secondary inflammation, etc.

In these cases, on recovery from the acute form that develops after the immediate effects of the trauma (coma, epilepsy, deliria, stupor), it is highly probable that a mental deficiency will remain.

Grave also is the prognosis of the late psychoses of degenerative type (epilepsy, immorality, impulsiveness).

Much less grave are the hysterical and neurasthenic forms, which, however, are sometimes indefinitely prolonged, especially when medico-legal decisions are involved. In those other primary or secondary psychoses that depend upon an intoxication due to the increased vulnerability of the cerebrum, the prognosis must be guided by general principles, at the same time taking into account the special features of each case.

Therapy.—The therapy includes various methods and resources. The comatose states are treated by cardiac stimulants, blood-letting, intestinal depletions, etc., according as there are present signs of collapse or of increased endocranial pressure. The consecutive inflammatory processes are to be treated on general lines. For the rest, the treatment can only be symptomatic. Deliria, hallucinations, psycho-motor agitation, epilepsy, and katatonia are treated on the lines laid down in the respective chapters.

The hysterical syndromes are aggravated, as already mentioned, by the influence of legal proceedings.

Surgical intervention is often called for, either by the existence of bony depressions or when there are evident signs of a circumscribed cortical or subcortical lesion, irritant or paralyzing, even although the conditions are not complicated by any fracture or depression of the cranial bones. The site for trephining will be indicated by the nature of the symptoms, which may be referred to a particular cerebral region. The reviews of surgery and neuropathology contain a large number of records of trephinings performed in cases of injuries to the head.

Trephining is also indicated in the reflex neuroses and psychoses resulting from injury. Several years ago I had occasion to publish details of an interesting case of this kind (Bianchi, '*Contributo alla terapia chirurgica dell' epilessia*,' *Annali di Neurologia*, 1891).

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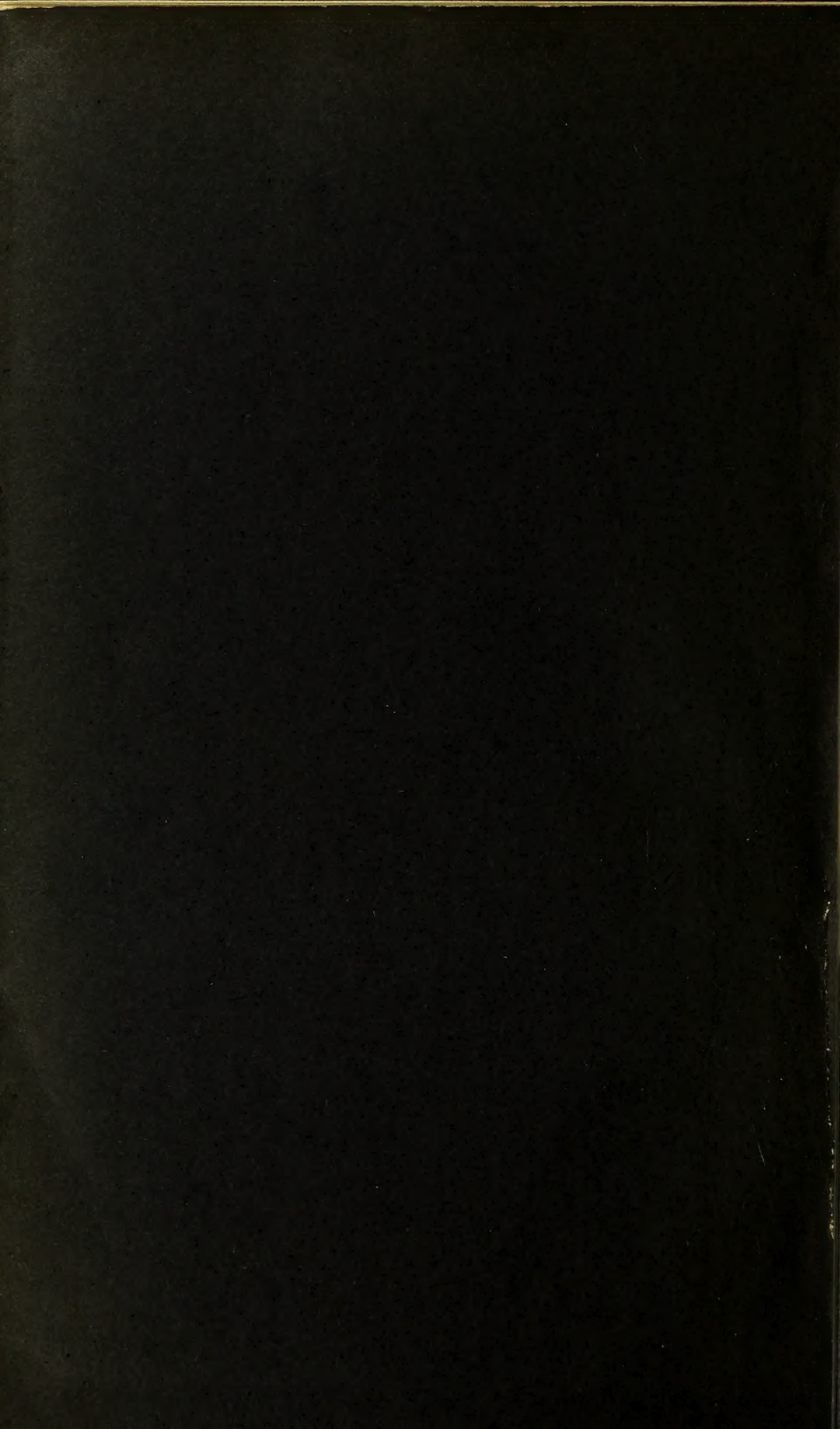
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